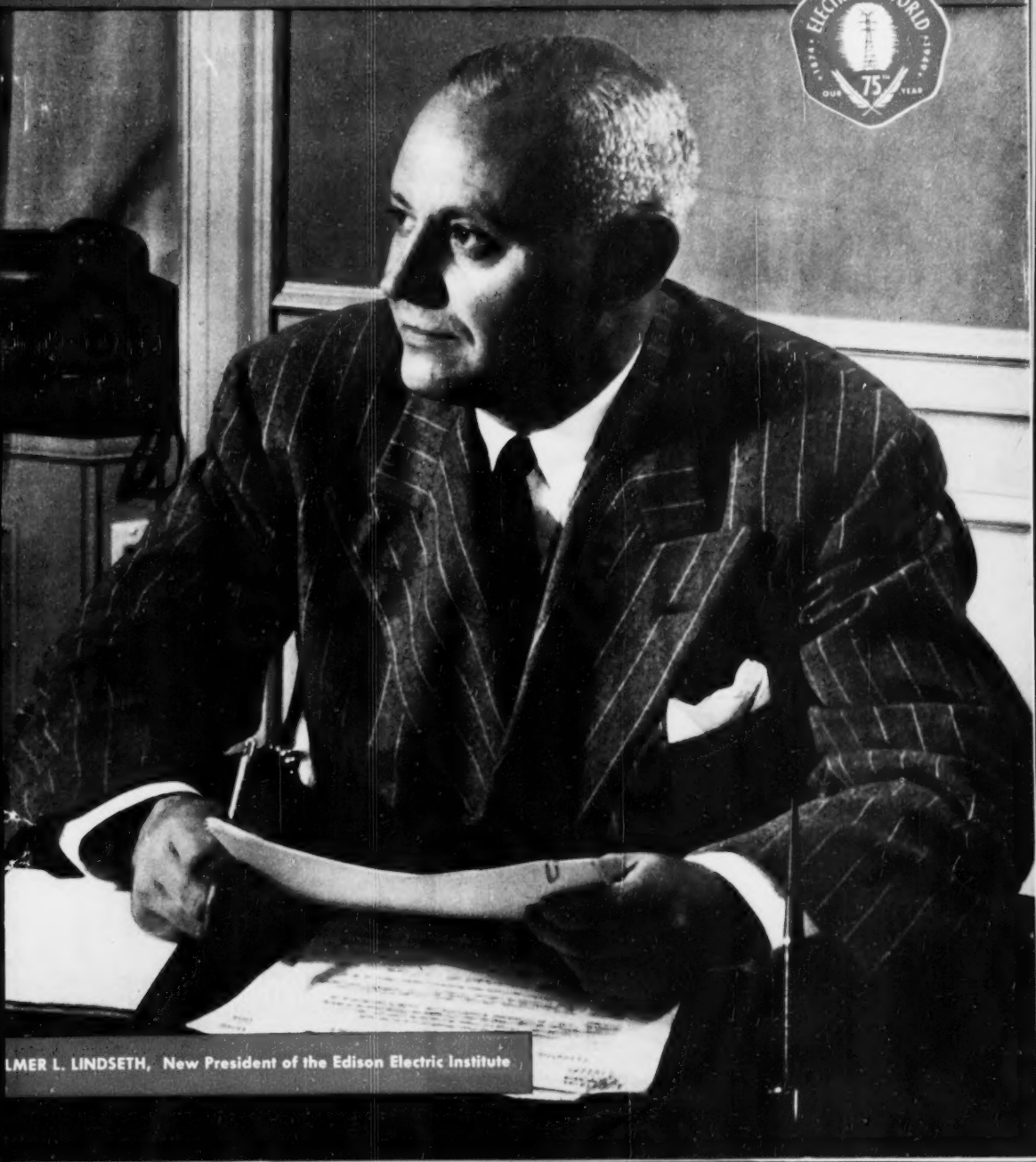
ELECTRICAL WORLD

A McGRAW-HILL PUBLICATION

JUNE 4, 1949



LMER L. LINDSETH, New President of the Edison Electric Institute

"The effect of the temperature on the operation of thermally-controlled circuit-breakers should be taken into consideration in the application of such circuit-breakers when they are subjected to extremely low or extremely high temperatures."

(From the 1947 National Electric Code book, page 52)

Circuit Breaker "Derating" Advised by the Code

But— UNreliable UNsatisfactory and UNnecessary

Murray FULLY MAGNETIC Circuit Breakers

Have NO Thermal Element... Are NOT Affected by Heat... NEVER Need "Derating"

IN COMPACT PANEL BOXES

. . . heat builds up, often trips thermal circuit breakers far below rated load. But Murray Fully Magnetic Breakers have no thermal element, are not affected by heat.

IN BOILER ROOMS

. . . utility rooms . . . or near steam lines, thermal circuit breakers trip right and left. But Murray Fully Magnetic Breakers keep circuits in service because they are not affected by heat.

IN DIRECT SUNLIGHT

. . . as in yard pole equipment, circuit breaker temperatures can vary 100° overnight! Here Murray Fully Magnetic Breakers are a must — hot or cold, they trip reliably at the same overload current values.

Inverse time delay is achieved in Murray Fully Magnetic Circuit Breakers by a simple, hermetically sealed, factory calibrated hydraulic piston. No "derating" is ever needed!

In hot or sunny locations, if you want to serve a 15 amp. load you can use:

1. A 15 amp. Murray Fully Magnetic breaker on No. 14 wires, or
2. A 20 amp. thermal breaker on No. 12 wires. (N.E. Code, page 321)

WHY WIRE WASTEFULLY?

Murray Fully Magnetic Breakers are available in 2, 4, or 8 breaker load centers. Each breaker can be *individually* replaced with breaker of same, lower or higher rating.

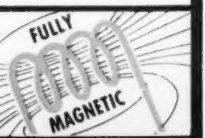
Single pole breakers in 10, 15, 20, 25, 30, 35 and 50 amp. ratings. Only two handle positions — Off and On.

CUTS SERVICE CALLS

Get the full facts on Murray Fully Magnetic Circuit Breakers. Operating characteristics and construction features are given in this informative folder. Write for your copy now.

FOR TOMORROW'S LOADS...

Equip Today!



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SWITCHES • CURRENT LIMITING REACTORS • CROWS'NEST AERIAL LADDERS

ELECTRICAL WORLD

Published for 75 years for those engaged in the business of generating, transmitting, distributing or applying electric power

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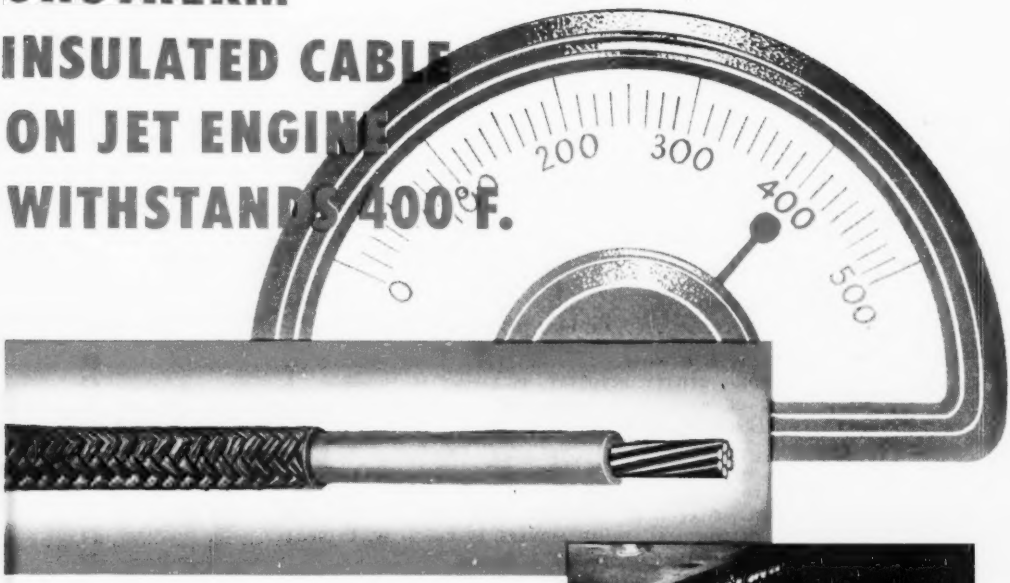
ELECTRICAL WORLD, Published weekly by McGraw-Hill Publishing Company, Inc. Publication Office, 99-129 North Broadway, Albany 1, N. Y. Editorial and Executive Offices, 330 West 42nd St., New York 18, N. Y. James H McGraw (1860-1948), Founder. James H. McGraw, Jr., President; Curtis W. McGraw, Vice-President and Treasurer; Eugene Duffield, Executive Assistant for Publications; Nelson Bond, Director of Advertising; Joseph A Gerardi, Secretary; J E Blackburn, Jr, Director of Circulation. Subscription rates: Single copy 35 cents. In the United States, $6 a year, $9 for two years, $12 for three years. Canada, $7 for one year, $11 for two years, $14 for three years. (Canadian money at par.) Pan-American countries, $15 for one year, $25 for two years, $30 for three years. All other countries $20 for one year, $30 for two years, $40 for three years. Entered as second-class matter, November 16, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in U. S. A. Copyright 1949, by McGraw-Hill Publishing Company, Inc. Permission required to reproduce any of contents. Cable address McGRAW-HILL, New York. Member ABP. Member ABC

OKOTHERM INSULATED CABLE ON JET ENGINE WITHSTANDS 400° F.



Okotherm cables for high temperature service can be made in a wide range of sizes and types, using glass, asbestos or other protective coverings.

THE REMARKABLE heat-resisting quality of Okotherm insulated cables has been highlighted by their adoption in a jet engine that develops temperatures as high as 400° F. As a result of intensive investigations by Okonite researchers of heat-resisting materials, it was found that ignition wire insulated with Okotherm would fulfill the requirements. Consequently it became the first to gain approval for the new engine.

Compounded with silicone, Okotherm insulation retains its dielectric strength after long-time exposure to high temperatures as well as those as low as —65° F. Okotherm insulation helps wiring withstand outdoor weathering without deterioration—keeping flexible at all operating temperatures, resisting oxidation and ozone.

In addition to high voltage ignition, cables with Okotherm insulation should be considered for electric ovens, furnaces and motors, high-intensity floodlights, street lights and neon signs—wherever excessive heat must be encountered.

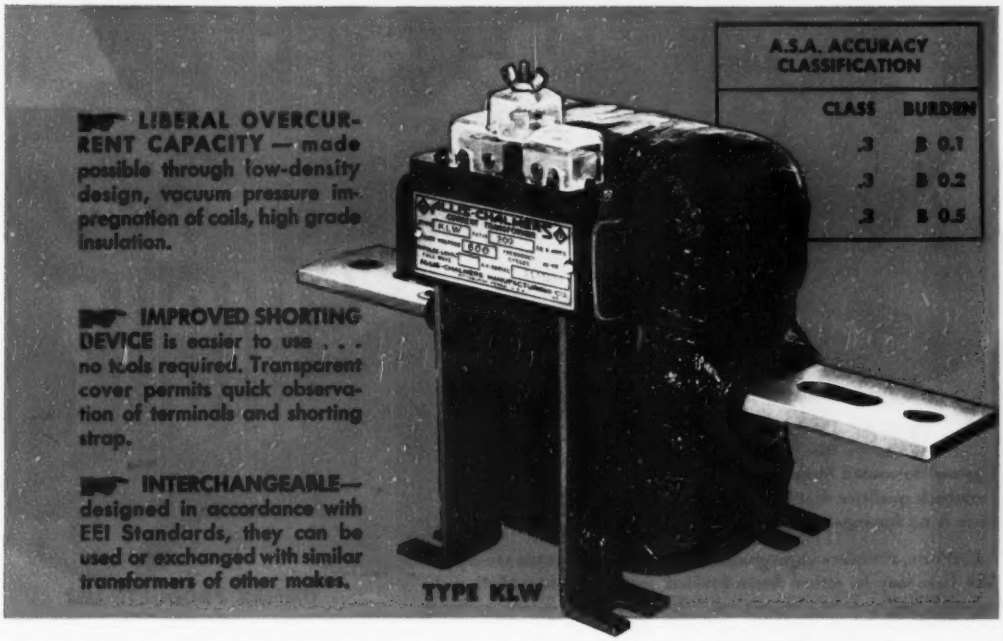
Oven and freezing tests show that Okotherm insulation retains its properties over a wide temperature range where ordinary insulations fail due to loss of elastic properties or thermal instability.

If you should have no immediate use for heat-resisting Okotherm, some other special-purpose Okonite cable may fit your needs. "Unusual" cable installations have a way of turning out to be Okonite. Problem solving is our business. Why not talk over your cable problem with an Okonite engineer? The Okonite Company, Passaic, New Jersey.

THE BEST CABLE IS YOUR BEST POLICY 7119

OKONITE insulated wires and cables

NEW!.. 600 Volt Current Transformer


A.S.A. ACCURACY CLASSIFICATION
CLASS BURDEN
.3 B 0.1
.3 B 0.2
.3 B 0.5
LIBERAL OVERCURRENT CAPACITY — made possible through low-density design, vacuum pressure impregnation of coils, high grade insulation.
IMPROVED SHORTING DEVICE is easier to use . . . no tools required. Transparent cover permits quick observation of terminals and shorting strap.
INTERCHANGEABLE— designed in accordance with EEI Standards, they can be used or exchanged with similar transformers of other makes.
TYPE KLW

THE NEW TYPE KLW is designed for indoor metering on circuits up to 600 volts. Accuracy is suitable for use with one or two watt-hour meters; continuous overload to 150% on 400 ampere rating, and to 200% on the 200 and 600 ampere rating.

NEW TYPE KLW ROUNDS OUT LINE

The KLW is an important addition to Allis-Chalmers' expanding line of instrument transformers — now more than 400 types and ratings from which to select. Complete interchangeability of units in like voltage classes is important too, because it means simplified stocking, lower inventory.

Send coupon for new bulletin giving complete information on the KLW and *all other* instrument and metering transformers in A-C's extended line. Or call your nearby A-C sales representative.

THERE'S AN "A-C" INSTRUMENT OR METERING TRANSFORMER FOR EVERY NEED!

CURRENT TRANSFORMERS — primary amperes from 10 to 10,000 max.; up to 69 kv.

POTENTIAL TRANSFORMERS — up to 69 kv primary volts (line to line).

A-2752

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Please send new, complete Instrument Transformer bulletin 6187168.

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Pioneers in Power and Electrical Equipment from Generation through Utilization

ARE ASSEMBLY COSTS TOO HIGH?

ONE WAY you can save is by reducing the lost time and motion due to inferior tubing. Dieflex Varnished Tubings and Saturated Sleevings have the flexibility, smooth bore, and push-back qualities that keep assembly workers' fingers flying. And there is no fraying—of tubing or nerves.

Uniform, complete impregnation assures high dielectric strength. The base may be either finely braided cotton or glass fiber, and impregnation may be oleoresinous varnish or silicones—depending on the requirements of your products.

Would you like to try Dieflex in your assembly and prove to your own satisfaction how much difference it makes? We will gladly arrange to supply the quantities you need for a practical test.

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VARNISHED TUBING PRODUCTS

DIEFLEX PRODUCTS LIST

MADE WITH BRAIDED COTTON SLEEVING BASE

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Grade B-1 Standard Grade Varnished Tubings
Grades C-1 and C-2 Heavily Coated Saturated Sleevings
Grade C-3 Lightly Coated Saturated Sleevings
Heavy Wall Varnished Tubings and Saturated Sleevings

MADE WITH BRAIDED GLASS SLEEVING BASE

Grade A-1 Magneto Grade Varnished Glass Tubings
Grade C-1 Extra Heavily Saturated Glass Sleevings
Grade C-2 Heavily Saturated Glass Sleevings
Grade C-3 Lightly Saturated Glass Sleevings
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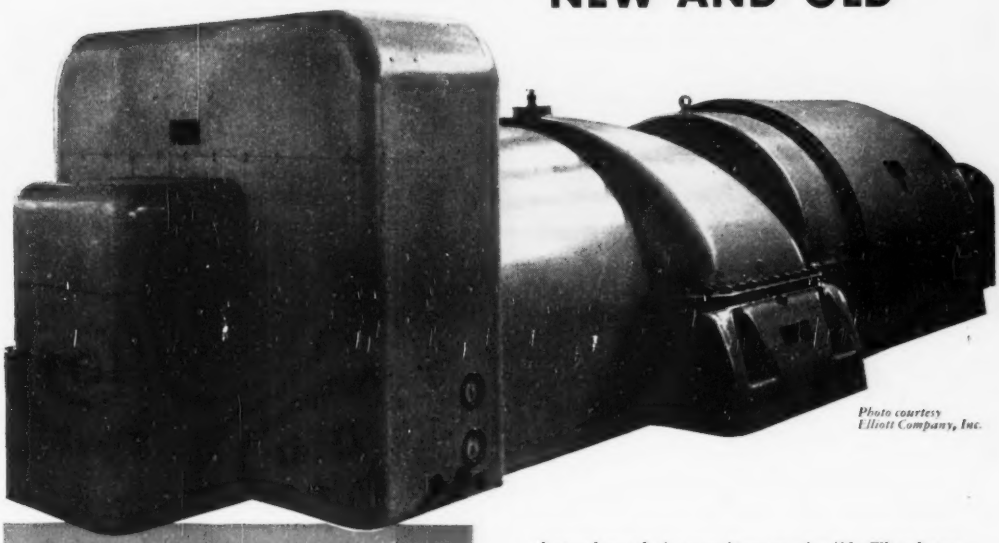
Sing a song of safety

FOR TURBINES NEW AND OLD



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Assure freedom from rust and sludge by lubricating with Texaco Regal Oils (R&O)

TURBINES lubricated with *Texaco Regal Oils* (*R & O*) run at top form and take load peaks in stride. That's because effective inhibitors keep rust and sludge from forming, and special processing curbs foaming.

Texaco Regal Oils (*R & O*) give extra protection throughout their extra long service life. They keep circulating systems clean, enabling the oil to flow freely . . . keeping bearing temperatures normal and governors instantly responsive.

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Greater efficiency, economy and safety—let a Texaco Lubrication Engineer show you how to get them all. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Regal Oils (R&O)

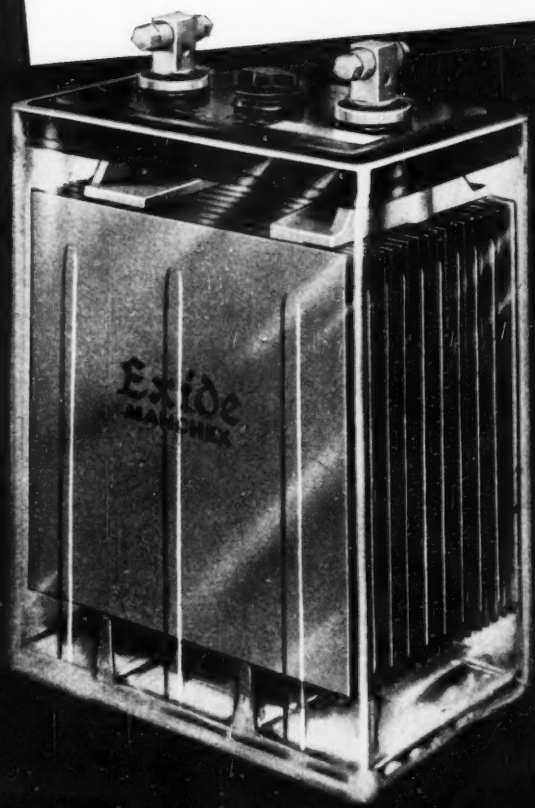
FOR ALL TURBINES

Tune in . . . TEXACO STAR THEATRE every Wednesday night starring Milton Berle. See newspaper for time and station.

THE NEW EXIDE-MANCHEX BATTERY

POWER . . . PERFORMANCE . . . ECONOMY

for Central Station Service



Exide
BATTERIES

An important feature of the new Exide-Manchex Battery is the famous manchester positive plate with its unique lead button construction. The buttons, rolled strips of corrugated lead, are pressed into holes of the lead-antimony grid. Forming action expands the buttons and locks them securely in place. Only a comparatively small portion of the total lead is formed initially into active material . . . the remainder is available for gradual conversion in service.

Negative plates, separators and other elements are designed to match the long life and efficiency of the positive plates. All combine to provide a battery of exceptional power and long-lasting, trouble-free performance.

Use Exide-Manchex Batteries for switchgear and control bus operation, emergency light and power, and other storage battery services. It will provide up to 100% more capacity in the same given space.

1888

DEPENDABLE BATTERIES FOR 61 YEARS

1949

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

"Exide" Reg. Trade-mark U. S. Pat. Off.

Longer Life

WITH JOSLYN URC POLE LINE HARDWARE

Extend the life span of your pole lines by using Pole Line Hardware made of low alloy high strength steel. This steel will resist atmospheric corrosion four to six times longer than carbon steel and, with the additional protection of Joslyn galvanizing, the expected life of pole line hardware is at least doubled—and this at a negligible increase in cost. Actual figures show that the increase in overall cost of a typical distribution line using URC hardware is less than 2%—a cheap price to pay for double the life. In addition to this, URC hardware is stronger, with a minimum yield strength 50% greater than that of regular steel.

If you are in an area where this happens to your hardware before the ultimate life of the rest of the line has been reached—better consider Joslyn URC Hardware.

Write for new catalog of Long Life Pole Line Hardware.

Branch offices in principal cities

THE JOSLYN CO.
THE SOUTH EAST-JOSLYN CO.
SOUTHERN JOSLYN CO.
JOSLYN SOUTHWEST CO.
JOSLYN PACIFIC CO.

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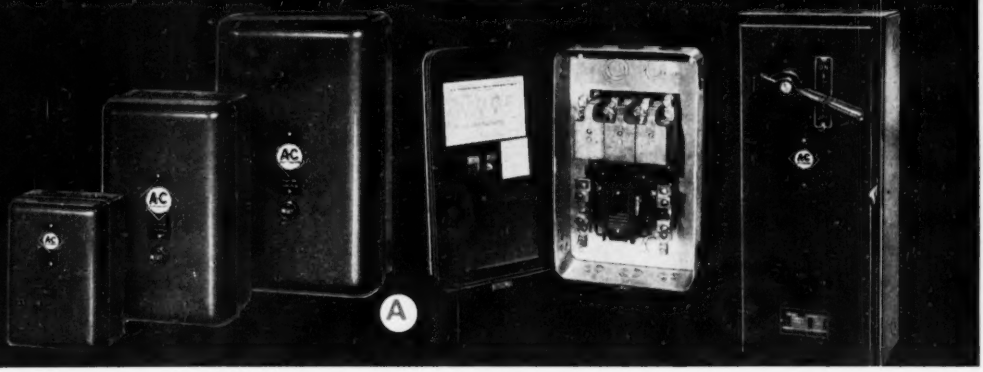
Complete Pole Line Equipment

30 NORTH WACKER DRIVE, CHICAGO 6, ILL.

MFG. AND SUPPLY CO.

TO CONTROL *ANY* MOTOR...



A GENERAL PURPOSE ACROSS-THE-LINE-STARTERS for *squirrel-cage motors*, or for use as primary switches on *wound rotor motors* are offered in Manual, Magnetic, Combination, Reversing, and Multi-speed types.

MANUAL STARTERS IN NEMA sizes 0 and 1 are offered in a variety of enclosures.

MAGNETIC STARTERS provide remote control, available in NEMA sizes 0 through 7 for motors to 600 hp.

COMBINATION STARTERS combine a full voltage magnetic starter and a disconnecting switch (either fusible or non-fusible) or an air circuit breaker, in a single enclosure.

REVERSING STARTERS for starting, stopping and reversing *squirrel-cage* motors to 200 hp. Also MULTI-SPEED STARTERS for two, three and four speed motors in Manual and Magnetic types.

B WHEN REDUCED VOLTAGE STARTING is a requirement, Allis-Chalmers offers a line of Manual and Magnetic Auto-Transformer Reduced Voltage Starters as well as Magnetic Primary Resistor Starters.

Specify an Allis-

Allis-Chalmers Offers Both Full and Reduced Voltage Starters for Squirrel-Cage and Synchronous Motors as well as Control for Wound Rotor Motors.

☞ **YOU GET WIDE SELECTION** of starter type, size and enclosure for each type motor.

☞ **YOU GET DEPENDABLE OPERATION!** Allis-Chalmers starters are generously designed, durably built.

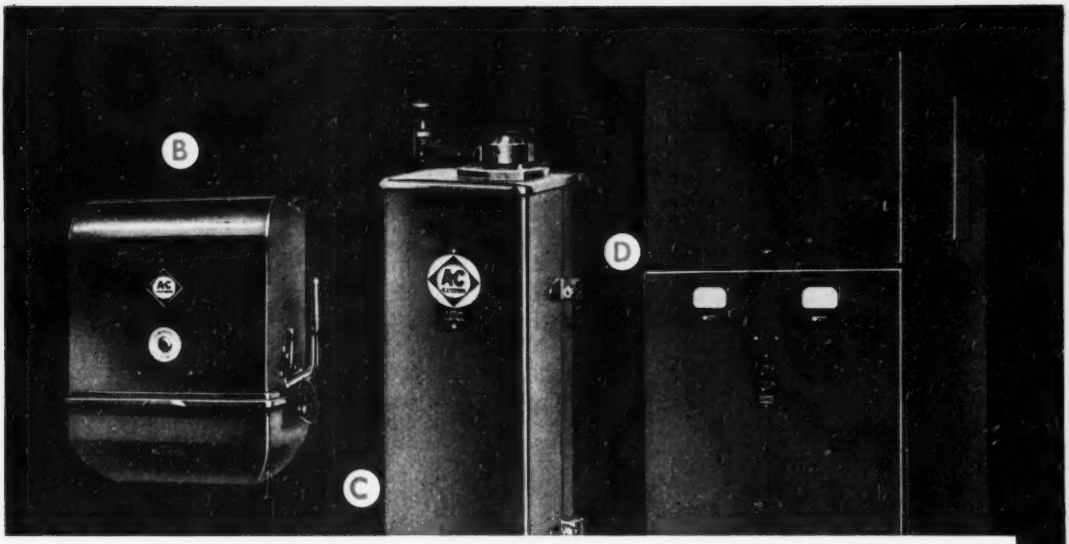
☞ **EASE OF MAINTENANCE** results from *built-in* accessibility of renewable parts.

☞ **MANY PROTECTIVE FEATURES!** Overload, undervoltage, interlocking and other devices mean greater safety for equipment and personnel.

☞ **PLUS BROAD APPLICATION EXPERIENCE!** And that means the *right* starter for *your* job! Allis-Chalmers engineering experience on over 1600 products covers every major industry.

Pioneers in Power and Electrical Equipment From Generation Through Utilization

ALLIS-



C FOR WOUND ROTOR MOTORS a wide variety of starters are offered. Typical are: Manual Primary and Secondary, Magnetic Primary and Secondary, Magnetic Primary with Manual Secondary, and Drum Type Reversing Primary and Secondary.

FOR SYNCHRONOUS MOTORS, three types of Starters are built by Allis-Chalmers: Full Voltage Magnetic, Reduced Voltage Semi-Magnetic, and Reduced Voltage Magnetic. All types are built in sizes to control motors from 20 to 3000 hp and feature positive synchronizing, maximum accessibility, easy adjustment, durable construction, automatic shut-down if starting sequence is incomplete, and other protective measures.

D HIGH INTERRUPTING CAPACITY STARTERS are built for High Voltage *squirrel cage, wound rotor* and *synchronous* motors. These starters have current limiting features and can be connected directly to circuits requiring up to 150,000 kva interrupting capacity at 2300 volts and 250,000 kva at 4160 to 4600 volts without a back-up circuit breaker.

Chalmers MOTOR STARTER!

THE NAME ALLIS-CHALMERS, throughout industry, stands for quality-built, lasting electrical equipment. You can depend on Allis-Chalmers Motor Starters to give you the same kind of performance. Here is exactly what we offer you:

Both Manual and Magnetic, Full and Reduced Voltage Starters for Squirrel-Cage and Synchronous Motors . . . Manual and Magnetic Starters for Wound Rotor Motors — all for widest possible range of horsepower and voltages.

Depend on this wide range of starters, backed by industry-wide application engineering experience, for the answer to *your* control needs. You can specify an Allis-Chalmers starter to control *any* motor, regardless of size! See your nearest A-C Authorized Dealer or Sales Office, or write direct for bulletin 14B7132. A-2677

ALLIS-CHALMERS, 932A SO. 70 ST.
MILWAUKEE, WIS.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

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MOTORS — ½ to 25,000 hp and up. All types.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

CHALMERS

On the Avenue, too...

MALLORY ELKONITE* CONTACTS

Turn Night into Day in a Matter of Seconds!

AS night falls, row upon row of street lamps are lighted up at a given instant. When this happens, thousands of contacts—hidden in various relay systems—receive the shock of a terrific current inrush. To withstand such a shock the contacts have to be made of a tough material—that's why so many relay units use Mallory Elkonite Contacts.

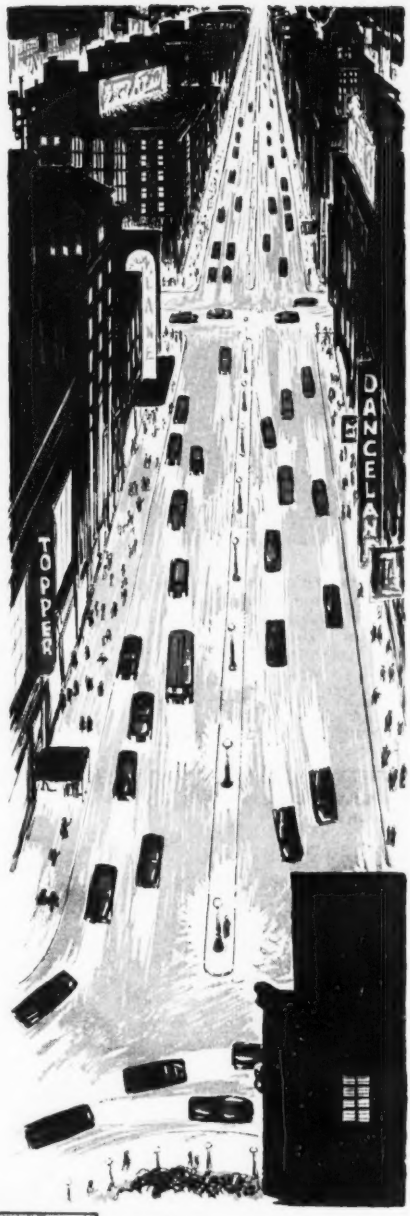
Thanks to a special Mallory process, Mallory-developed Elkonite has all the characteristics required for such heavy duty applications. Elkonite features hardness, conductivity, resistance to wear and impact, to erosion by arcing, to sticking. No wonder Elkonite has proved its dependability in a wide variety of applications—ranging from lift trucks to household circuit breakers.

What's Your Problem?

Elkonite is only one of many types of Mallory contact materials available to you. Mallory has produced so many kinds that there rarely is a problem that cannot be solved by a standard Mallory Contact. But if such a problem should come up—Mallory engineers are equipped to develop the contacts you need. Consult them now.

For all kinds of contact materials and service, you can't beat Mallory as a dependable, experienced source.

In Canada, Made and Sold by Johnson, Matthey & Mallory, Ltd. 110 Industry St., Toronto 15, Ontario



Electrical Contacts and Contact Assemblies

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Capacitors — Rectifiers
Contacts — Switches
Controls — Vibrators
Power Supplies
Resistance Welding Materials

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ON HIGH VOLTAGE TRANSMISSION LINES

COPPERWELD COUNTERPOISE WIRES REDUCE FLASHOVERS

Where soil conductance is poor, the use of Copperweld* Counterpoise Wires to supplement tower grounds assures better lightning protection.

Connected to the tower legs and buried in the earth, Copperweld Counterpoise Wires reduce the resistance of tower grounds and increase the coupling between overhead ground wires and conductors —thus minimizing flashovers and possible outages of the line.

The thick copper covering of Copperweld Counterpoise Wires provides an excellent high conductivity path to earth and the strong alloy steel core permits long lengths to be "plowed in" without breakage or splicing. Rust-proof, pliable and easy to install, Copperweld Counterpoise Wires are nevertheless tough, rugged and not susceptible to theft.

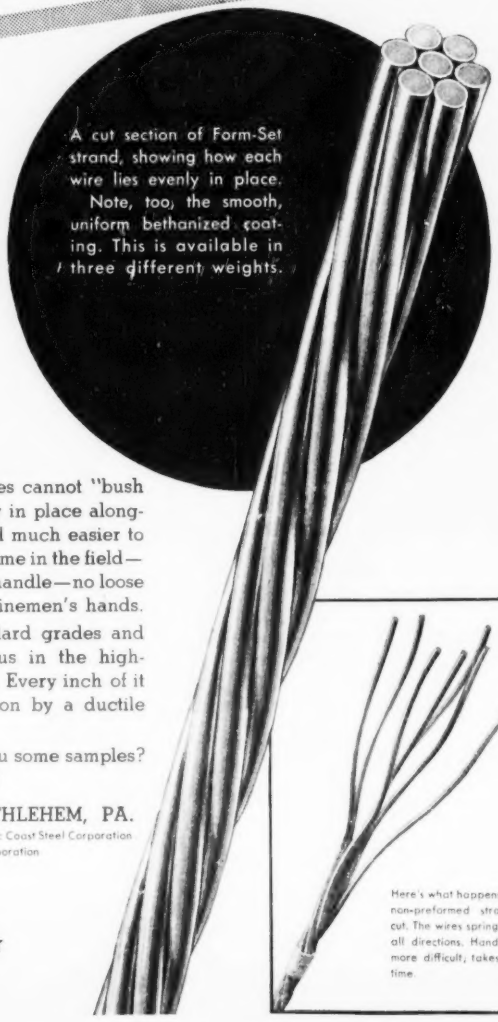
So, whether your local conditions call for the "parallel" or "crowfoot" type of grounding arrangement—install Copperweld Counterpoise Wires to improve the operating reliability of your transmission lines. Write for Engineering Data Bulletin E.D. 1824.

COPPERWELD STEEL COMPANY
GLASSPORT, PA.
Sales Offices in Principal Cities

*Trade Mark

Copperweld TRADE MARK **COUNTERPOISE WIRES**

FORM-SET STRAND HAS *Extra* FEATURES THAT COST YOU ALMOST NOTHING!



A cut section of Form-Set strand, showing how each wire lies evenly in place. Note, too, the smooth, uniform bethanized coating. This is available in three different weights.

Bethlehem's preformed strand, known to the trade as Form-Set, has certain advantages that don't exist in the usual non-preformed type. Yet it sells for *very little* more than ordinary strand; the added cost is astonishingly low. Hence those extra features are yours for almost nothing.

What *are* the extra features? Here they are in a nutshell:

When Form-Set strand is cut, the wires cannot "bush out" or fly apart. Each wire lies placidly in place alongside its neighbors. This makes the strand much easier to handle; easier to insert in fittings. Saves time in the field—and temper, too. Also, it's much safer to handle—no loose wires sticking out to gouge or scratch linemen's hands.

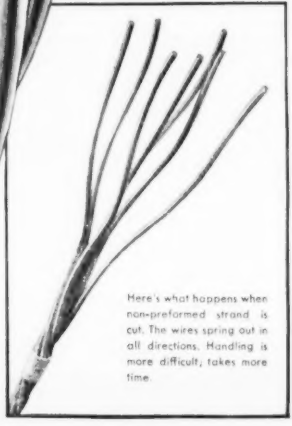
Form-Set strand is made in all standard grades and sizes, but it is particularly advantageous in the high-strength and extra-high-strength grades. Every inch of it is bethanized—guarded against corrosion by a ductile zinc jacket applied electrolytically.

Why not let a Bethlehem man show you some samples? There's nothing like seeing for yourself!

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

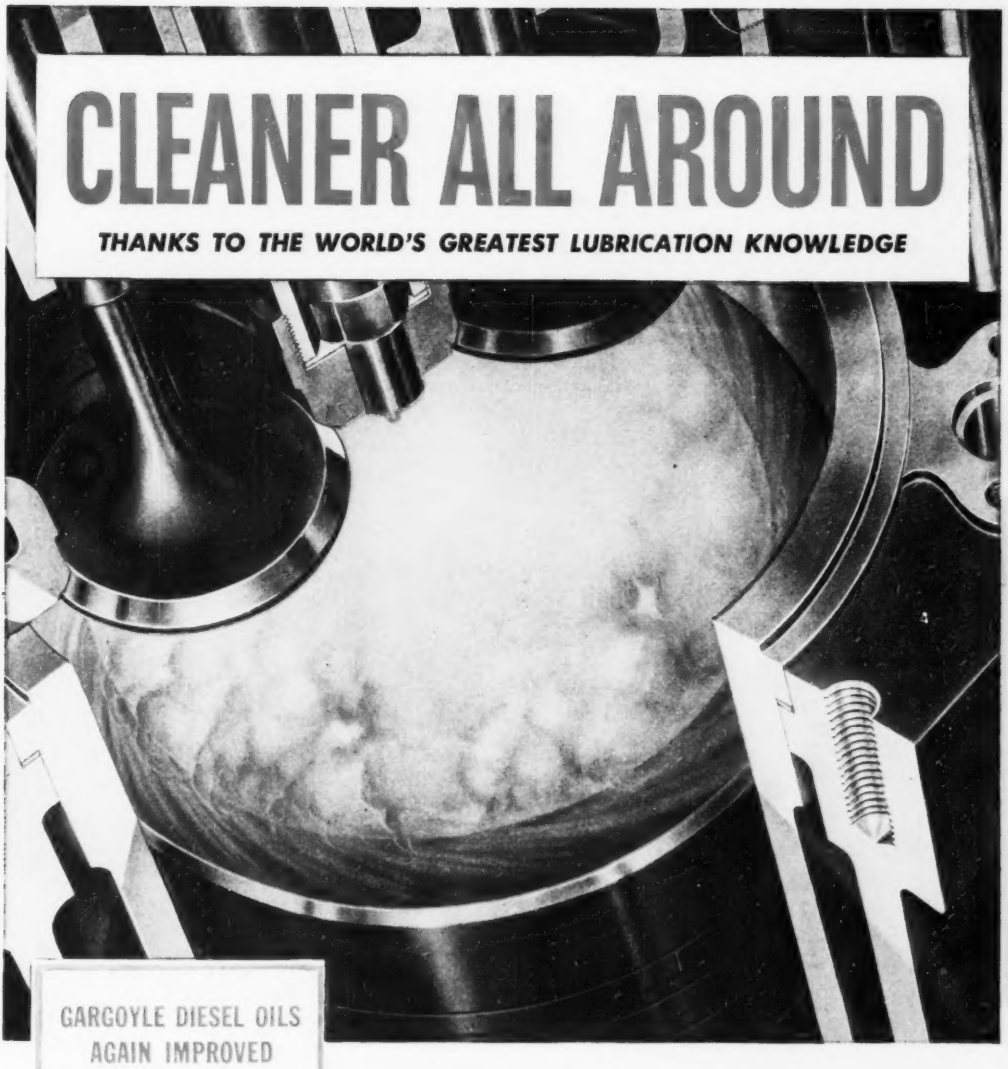
★ BETHLEHEM STEEL ★



Here's what happens when non-preformed strand is cut. The wires spring out in all directions. Handling is more difficult, takes more time.

CLEANER ALL AROUND

THANKS TO THE WORLD'S GREATEST LUBRICATION KNOWLEDGE



GARGOYLE DIESEL OILS
AGAIN IMPROVED
to Minimize Deposits on Pistons, Rings, Vital Moving Parts.

★

Backed by Skilled Engineering Service.

★ ★

For CONTINUOUS POWER—Rely on the BEST!

High output Diesels, like this, call for something special in lubricating oils to combat deposits on pistons, rings, vital moving parts. So, Socony-Vacuum has come up with another important development. The newest Gargoyle Oils possess special properties that reduce oil oxidation, and also make certain that contaminating soot and sludge are dispersed...do not collect on vital parts. For details, see your Socony-Vacuum Representative.

SOCONY-VACUUM

GARGOYLE Lubricants

SOCONY-VACUUM OIL COMPANY, INC.
and Affiliates: MAGNOLIA PETROLEUM CO.
GENERAL PETROLEUM CORPORATION

Rely on **SOCONY-VACUUM**
Correct Lubrication

Plus these 8 Important Features

LOW VOLTAGE Protection by flush-mounted "Start-Stop & (Overload) Reset" Push Button • OVERLOAD protection, instantaneous trip on heavy overloads or short circuits—inverse-time-element trip for prolonged over-currents • SHORT CIRCUIT Protection regardless of available KVA • CUSHIONED STARTING, gives a smoother start and lower inrush current, improving starting conditions—may save cost of more expensive reduced voltage starter • NO REPLACEMENTS to re-start, after a fault • AUTOMATIC field application by polarized field-frequency relay • FIELD REMOVAL should motor pull out of step and AUTOMATIC RESYNCHRONIZATION when motor re-accelerates the load • Completely-wired, self-contained unit for quick, *low-cost* installation.

Write for Complete Facts—Ask for No. 23 Accelerator Bulletin

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

HE'S DELIVERING ANOTHER LOAD OF CENTRAL RIGID STEEL CONDUIT

CENTRAL
~~SPANG~~
CONDUIT

Yes, you can depend on your Central Rigid Steel Conduit Distributor for rocket-fast delivery of nearly all the things he has for sale.

What's more you can depend on him for quality products and materials . . . like Central Rigid Steel Conduit. It has always been known for its fine bending, threading and cutting qualities. And the complete stock of Central Black, Cenlaco or Central White Rigid Steel Conduit carried by your distributor, makes it easy for you to get the type of electrical raceway that best suits your requirements.

When you need conduit or other electrical supplies, contact your Central Rigid Steel Conduit Distributor first . . . you'll find that he's a dependable source of supply.

SPANG-CHALFANT

Division of The National Supply Company
General Sales Office: Grant Bldg., Pittsburgh, Pa.
District Offices and Sales Representatives in Principal Cities

CENLACO a hot dipped galvanized and lacquered finish, inside and out.

CENTRAL WHITE electro-galvanized outside and black enameled inside.

CENTRAL BLACK permanent, baked-on black enamel finish, inside and out.

Quik Quiz on CONDULETS

Questions and answers
regarding the backbone of
an electrical wiring installation

Type C
Obround Condulet
Broken-away view
showing (1) tapered
threads, and (2) the
Wedgenut fastener

Question. When were CONDULETS first made?

Answer. In 1906 Crouse-Hinds Company introduced CONDULETS to the electrical wiring industry. CONDULETS represented an entirely new idea in conduit outlets, totally unlike the outlet boxes and fittings previously made. CONDULETS were destined to revolutionize electrical conduit installation practice.

Q. How did the word "CONDULET" originate?

A. Crouse-Hinds new conduit outlets needed a name so the word "CONDULET" was coined, a contraction of "conduit" and "outlet." It is registered in the U. S. Patent Office and designates a product made only by the Crouse-Hinds Company.

Q. What were the advantages of CONDULETS over previous outlets?

A. The older outlets were both unhandy and unsightly, while the new cast CONDULETS were streamlined, compact outlets that were handy to install and produced a neat appearing job. The oblong body with round ends suggested the name "Obround", which was applied to the first series of CONDULETS.

Q. Were they like the present Obround CONDULET?

A. There have been important refinements, but the basic design remains the same. The most notable improvement was the Crouse-Hinds Wedgenut fastener which provides a handy way to firmly attach the covers.

Q. How many types are now in the Obround Series?

A. Forty-nine types. Sizes to fit $\frac{1}{2}$" to 6" conduits, with a wide selection of interchangeable covers and wiring devices.

Q. What other CONDULETS have been added to the line?

A. Obround CONDULETS were so well received by the electrical trade that a variety of other types followed in rapid succession. In fact, the CONDULET line has grown far beyond the original concept and now includes, besides the items needed for the usual conduit installations, a complete line of explosion-proof and dust-tight CONDULETS for use in industries where explosive gases or dust require special electrical safeguards.

Q. Why are all the threads in CONDULET hubs taper-tapped?

A. Because all conduit threads are tapered and it makes an imperfect job if a tapered thread is screwed into a straight threaded hole. When using CONDULETS, the threads on the conduit firmly engage every thread in the hub, because both are tapered. This makes a rigid joint which will not loosen under vibration and also assures permanent ground continuity. Taper tapping is an important Crouse-Hinds feature.

Q. What about CONDULET quality?

A. CONDULETS have always been noted for the highest quality. They are scientifically designed in Crouse-Hinds Engineering Department and carefully manufactured in a modern factory by skilled craftsmen from the finest material obtainable. Crouse-Hinds operates four separate laboratories where trained technicians assist in the development of new products and maintain a constant control over the quality of CONDULETS.

Q. How many CONDULETS are there today?

A. More than 15,000 items constitute the present CONDULET line. Conduit installations in all parts of the world are equipped with CONDULETS.

Q. WHERE CAN I BUY CONDULETS?

A. From the beginning it has been the Crouse-Hinds policy to have . . . **A Nationwide Distribution through Electrical Wholesalers.** There is one near you.

CONDULETS
FLOODLIGHTS
TRAFFIC SIGNALS
AIRPORT LIGHTING

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee — Minneapolis — New York — Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Washington.
Resident Representatives: Albany — Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va.
CROUSE-HINDS COMPANY OF CANADA, LTD., *Main Office and Plant:* TORONTO, ONT.

A Nationwide Distribution Through Electrical Wholesalers

SIMPLE *or* COMPLEX *or* BOTH—

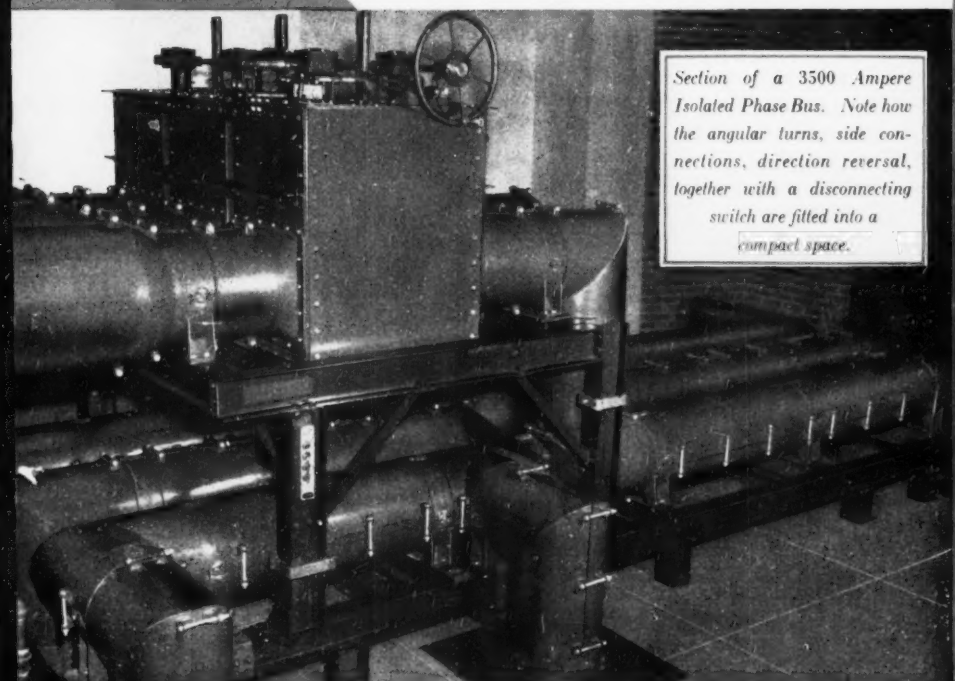
R&IE

ISOLATED PHASE, METAL ENCLOSED BUS STRUCTURES PROVIDE—

- highly reliable service
- reduction in maintenance
- complete factory fabrication
- all insulators in compression
- flexibility of arrangement
- extremely compact installation
- lower installation costs
- neat, trim appearance

CHECK the FACTS

Check all these advantages of isolated phase, metal enclosed bus structures against cable runs or cell structures. Then call in an R&IE engineer who will gladly discuss R&IE equipment for your installation.



Section of a 3500 Ampere Isolated Phase Bus. Note how the angular turns, side connections, direction reversal, together with a disconnecting switch are fitted into a compact space.

RAILWAY and INDUSTRIAL ENGINEERING CO., GREENSBURG, PA.
AFFILIATED WITH THE I-T-E CIRCUIT BREAKER CO., PHILADELPHIA, PA.
IN CANADA — EASTERN POWER DEVICES LIMITED, TORONTO

The Check List

CONDUCTOR SUPPORTS CLAMPS AND FITTINGS

DISCONNECTING SWITCHES INDOOR AND OUTDOOR

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

AUTOMATIC SWITCHING EQUIPMENT

METAL CUBICLES

TESTING DEVICES

PERMANENTE METALS' new mill in centrally located Newark, Ohio, is one of the world's largest single installations for the production of aluminum conductor.

Here's your new source of Aluminum conductor

Deliveries start next month!

CLIMAXING two years of preparation, first shipments of Kaiser ACSR and Kaiser Aluminum Cable will go forward next month, July.

A full range of standard sizes and standard strandings is being produced.

Initial orders will go to REA-financed Co-ops, U.S. Bureau of Reclamation, Bonneville Power Administration, other power projects and public and private municipal utilities from coast to coast.

If you act now you may be able to take advantage of some early delivery schedules which are still open. Inquire at any office of Permanente Products' nationwide sales organization.

Permanente Metals

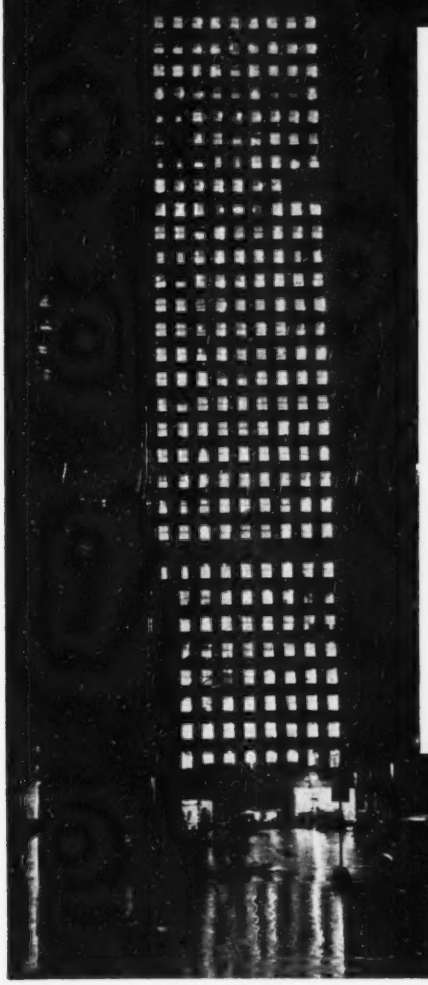
PRODUCER OF

Kaiser Aluminum Cable

SOLD BY PERMANENTE PRODUCTS COMPANY, KAISER BUILDING, OAKLAND 12, CALIF. . . . WITH OFFICES IN:
Atlanta • Boston • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Houston • Indianapolis • Kansas City • Los Angeles
Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Portland, Ore. • Seattle • Spokane • St. Louis • Wichita

Also available through General Electric Supply Corporation, Westinghouse Electric Supply Company

WHY A WELL PLANNED LIGHTING INSTALLATION NEEDS CORNING ALBA-LITE



Well planned fluorescent lighting results not only from the design and location of fixtures but also from the proper use of lighting glassware. Corning ALBA-LITE deserves special recognition for its qualities of diffusion and brightness control.

It diffusely transmits 60 to 65% of the light and diffusely reflects 25 to 35%, making its efficiency greater than 90% (the sum of reflection and transmission). This combined with even transmission and low panel brightness makes it adaptable to almost any type of fluorescent installation.

All these qualities are contained in a thin glass panel which permits shallow fixture construction, whether in fixtures or in complete ceilings. Cleaned easily, ALBA-LITE does not retain finger prints and resists weathering. It will not warp, discolor or scratch, regardless of the length of time in use. Add this to sound lighting qualities and you get efficient lighting performance.

Bulletin LS-17, now available, describes how ALBA-LITE is used for direct, semi-direct, semi-indirect lighting and completely luminous ceilings. It also covers Corning's complete line of Engineered Lightingware. You should have a copy if lighting is one of your responsibilities.

ALBA-LITE is used on almost every floor of the Esso Building, New York City; Architects: Carson & Lundin; Lighting Engineers: Pollak & Grieve; Fixture Manufacturer: Caldwell & Co., all of New York City.

CORNING GLASS WORKS, DEPT. EW-6, CORNING, N. Y.

Please send me your Data Book LS-17, "Corning Engineered Lightingware," describing MONA-LITE, ALBA-LITE and other Corning products.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

NEW UTILITY STATIONS C-E EQUIPPED

Includes stations placed in operation since the war (in white) and those under construction or being engineered.

New goes into

Planned back in 1946, the new Gadsden Steam Plant of the Alabama Power Company became a reality in April, 1949, when the first of the two units which comprise the initial section was placed in service. The second unit is scheduled for operation later this year.

Located on the Coosa River in the city of Gadsden, this fine, modern power station now takes its place as an important link in the entire Alabama system, a unit of the greater Southern Company system serving Alabama, Georgia and parts of Mississippi and Florida.

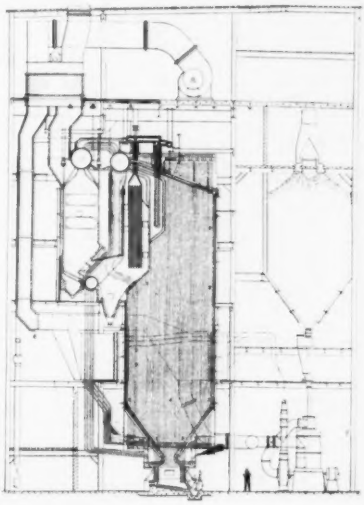
The initial equipment consists of two 60,000-kw turbine-generators, each served by a C-E Steam Generating unit, cross sectional elevation of which, together with brief description, appears on the opposite page. Two additional units of similar capacity are projected for this plant, giving an ultimate rated capacity of 240,000 kw. B-309

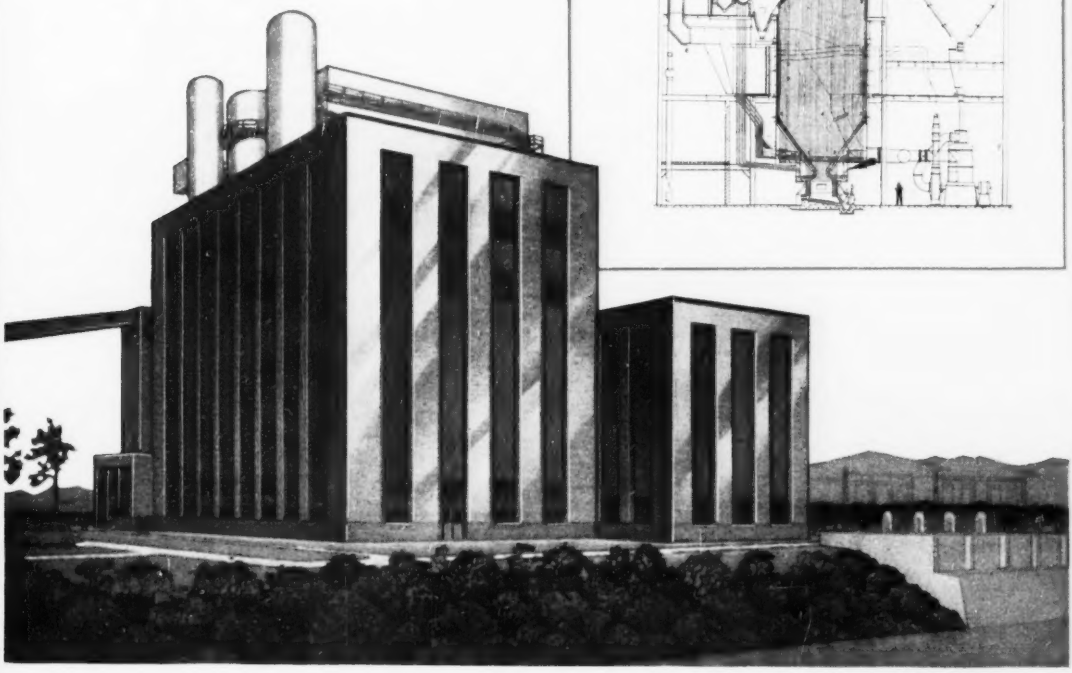
COMBUSTION ENGINEERING

A MERGER OF COMBUSTION ENGINEERING COMPANY, INC. AND THE SUPERHEATER COMPANY

Gadsden Plant service

The cross section at the right shows the C-E Unit that recently went into service at the Gadsden Plant. It is 3-drum boiler with 2-stage superheater and has an integral economizer in the rear pass. Regenerative air heaters follow the economizer surface. The unit is pulverized coal fired, using bowl mills and vertically-adjustable, tangential burners. Steam is produced at 875 psi and 860 F. A duplicate unit is now under construction.



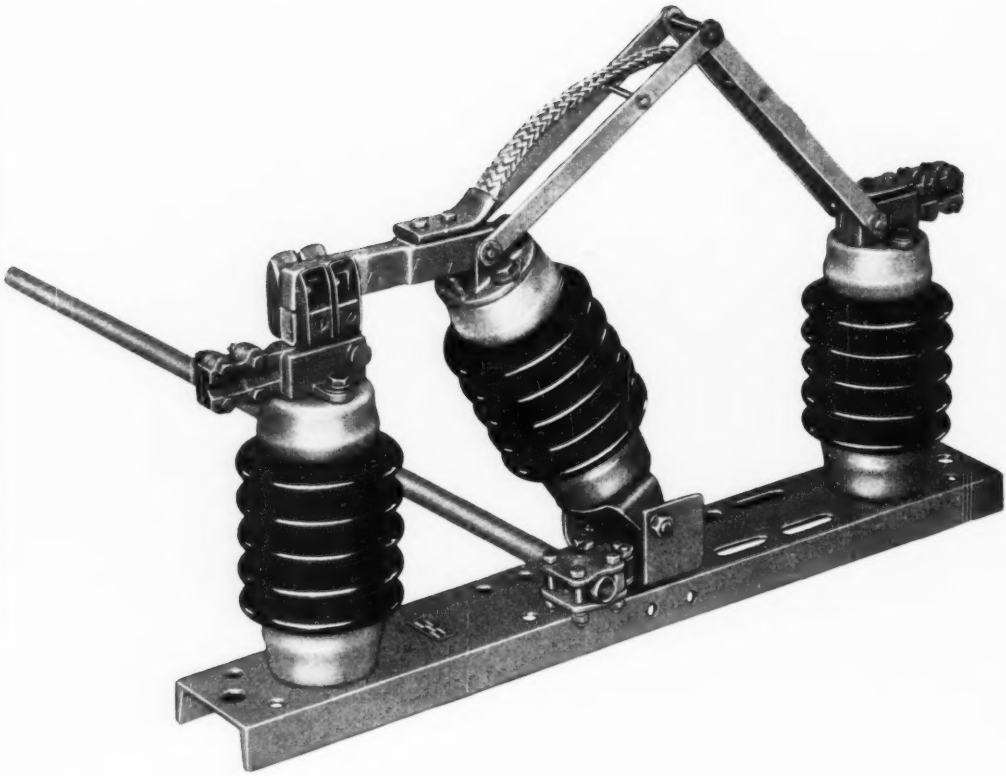


— SUPERHEATER, INC.
200 MADISON AVENUE, NEW YORK 16, N. Y.
C-E

Cole Electric Co.

8439 Steller Drive — Culver City, Calif.

TExas 0-4701



OUTDOOR DISCONNECTING SWITCH
Vertical Break; 15 KV.—400 Ampere
3 Pole—Single throw—Group operated
One Pole Shown
See Bulletin 33A

KYLE OIL SWITCHES

for manual or remote control of

shunt capacitors, street lights, airport lighting, flood and other outdoor lighting, many other uses

100 AMPS., 15,000 VOLTS

Kyle manual (type G) and remote control (type GR) oil switches are sturdy, dependable, and provide many features that make them preferred for a wide variety of light duty load-break operations.

Quick break . . . long contact life

Both the manual and motor driven switches provide quick-break operation. Double copper-tungsten contact tips are specially designed to minimize burning and pitting, assuring long life.

Both are light weight, easy to install, and their cost is moderate. They are safe to use. Mechanism is insulated from the tank. Head and operating handle are dead, the only live parts being the top bushing terminals.

Dependable Motor Drive

The type GR has a shaded pole motor with a 115 volt 60 cycle AC circuit with a selector switch to open and close the GR from a remote point. It may be operated manually if desired. The switch uses current only during the actual on or off operation. There are no magnets or coils requiring continuous current. Three single-phase type GR switches may be used to give simultaneous switching of three-phase circuits. Other than an annual oil change and inspection, these switches require no attention and give long, dependable operation within the recommended operating cycles.

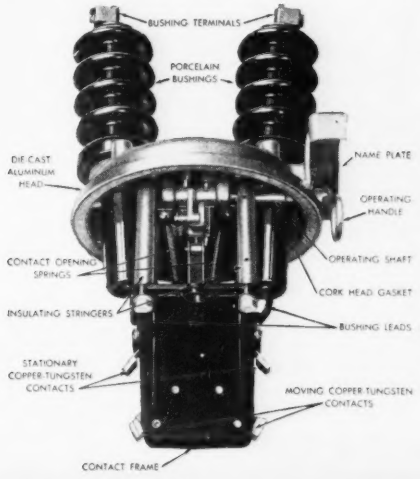
L-M'S COMPLETE OIL SWITCH LINE

Complete description, ratings, and dimensions in this handy Bulletin CR-2. Ask the L-M Field Engineer for a copy or write:

KYLE COMPANY
division of Line Material Company
Box 2077, Milwaukee 1, Wisconsin

Type GR Motor Driven Remote Control Switch

The manually operated type G looks the same except that it does not have the separately encased motor control mechanism shown on the left side. Total height, 18½"; tank 7⅛" diameter. Hangers for direct pole or cross-arm mounting.



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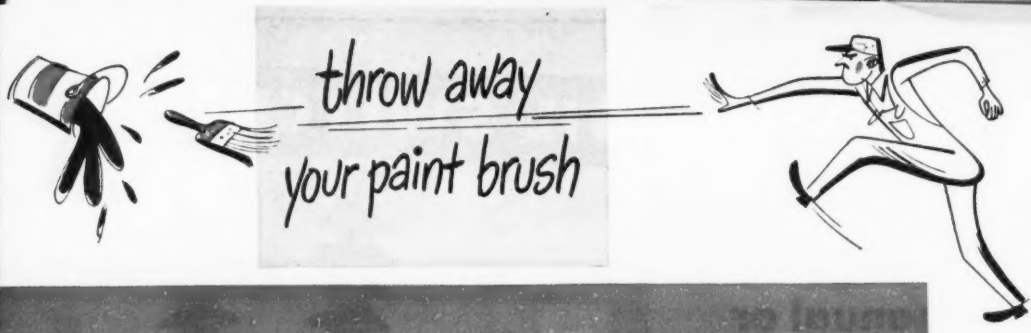
LINE MATERIAL Kyle Oil Switches

Complete Coordinated Equipment for All Distribution Requirements



get ELEMEX capacitors in Stainless Steel tanks

. . . with L-M "Lifetime" solder-sealed bushings

. . . in 15 and 25 kvar sizes in standard voltage ratings

. . . at NO increase in price

One utility company estimates that it costs $8 per unit to repaint capacitors. *Whatever* it costs is *too much*—when you can get *good* capacitors like ELEMEX in *stainless steel tanks!* And that's not even considering all their other advantages. They're pretty swell jobs; we think it would be worth your time to take a good look at them!

Stainless steel tanks mean no painting, ever! They also mean that the lineman doesn't have to take time to scrape paint to get a good ground. Tanks are "Hydis" treated—for good heat dissipation.

OTHER ELEMEX ADVANTAGES

Uniform terminal elevation—another time-saving feature. The 15's and the 25's have the same terminal elevation above the hanger in each voltage class. No change in leads when you replace or mix 15 *kvar's* with 25's. The 25's are 5¼" longer *below* the hanger, so they're easy to identify from the ground. All sizes same width and thickness, fit same hanger bolts.

"Paragroove" Connectors, another L-M "first": wire is just dropped in and clamped: no crossing of leads, no loose parts. **L-M "Lifetime"** solder-sealed bushings keep air out, keep ELEMEX liquid in—permanently.

Low unit stress: conservative design assures long life. **Safer:** discharge resistors across every pack or parallel group of packs. **Individual Testing** of packs, tanks and completed capacitor before, during, and after impregnation assures uniformity, long life.

Continuous individual evacuation, drying, and capillary impregnation with ELEMEX non-inflammable dielectric assure precise control of power factor and capacitance—an exclusive L-M research development.

ELEMEX capacitors have an outstanding 5-year service record . . . negligible rate of failure . . . *not one* leaky bushing . . . and thanks to the L-M braced sealed carton, only one has broken in shipment! A good record, don't you think?

WANT MORE INFORMATION?

Want details on ELEMEX? Data on capacitor application, uses, savings, power factor calculation? L-M's engineering staff will be glad to help you. **Ask the L-M Field Engineer** to get you the information you need, ***or write*** **Line Material Co., Milwaukee 1, Wisconsin.** 6983

LINE MATERIAL Capacitors

Complete Coordinated Equipment for All Distribution Requirements

L-M Engineers give you this

FUSE CUTOUT BUYER'S GUIDE

and a good example—the

L-M "PVD"

L-M designed the first wet-process porcelain cutout box on the market—more than 20 years ago, and has been the leader in fuse cutout development. Here, according to L-M engineers, is what it takes to *make a good* fuse cutout.

A cutout must keep itself *cool and dry*, so as to keep oxidation and deterioration of the cartridge to a minimum. Openings and leads should keep out rain so the cutout stays dry inside.

Contacts and contact areas should be large, with ample current carrying capacity, and preferably silver-plated. There should be a minimum number of electrical joints.

The cutout should have generous electrical clearance and creepage distances.

For ample rupturing capacity, the cutout should have free venting and a strong tube; and the tube should be securely anchored against recoil.

In a drop-out cutout, link parts should be well separated before the tube drops, so that the arc is cleared in the tube.

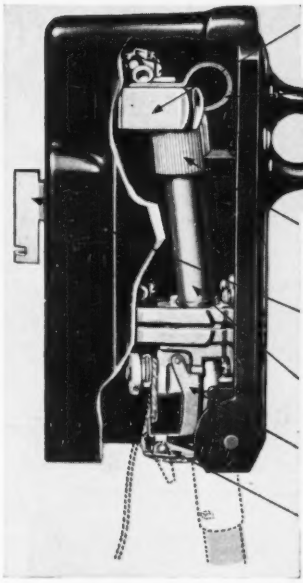
It is desirable to pull link parts straight out, as friction around the end of the tube will slow up the action.

Finally, the cutout must be simple to install. Re-fusing should be simple, and easy, even with gloved hands, to keep outages at a minimum.

GET THIS BULLETIN!

Quick reference to principal L-M open and closed cutouts; ratings, sizes, hangers. Ask the L-M Field Engineer for a copy or write **Line Material Co., Milwaukee 1, Wisconsin.**

DETAILS SHOW HOW "PVD" BENEFITS USERS



Large upper and lower contacts stay cool. Heavy reinforced silver-plated copper U straps; large contact areas.

Vertical Contact Spring: spring-tempered Monel, with silver-plated copper shunt; this spring helps push tube down, follows it part way to give extra clearing time; acts as top recoil absorber.

Large Knurled Cap, silvered, clamps fuse link button firmly into upper cartridge-ferrule. Easy to grasp for re-fusing.

Bracket Stud firmly cemented into the porcelain, not bolted through, to prevent corona and radio noise.

Heavy "Bakelined" Tube: the Bakelite prevents warping; the fibre lining extinguishes the arc.

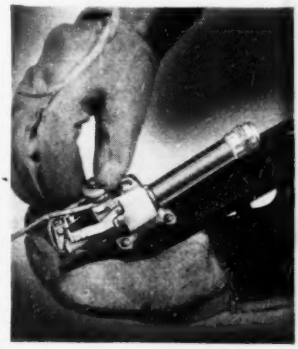
Latching Lever holds tube in place; tube *cannot* drop till after link has been flipped out of the tube.

Link Flipper and Spring: puts only 4 pounds pull on link. When link blows, flipper pulls it straight down out of tube—especially important in interrupting light fault currents. When flipper is down (dotted line) it releases latching lever, permitting tube to drop.

It signals: the tube is coated with canary yellow plastic; when it drops it is easily seen from the ground—saves "hunting".

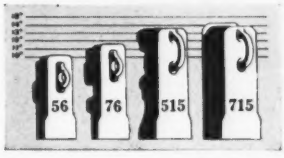
DOOR STAYS CLOSED

"PVD" is the original drop-out cutout on which the door stays closed, even after the link blows. This keeps out rain and sleet; the current carrying parts and the inside of the box stay dry, which prevents internal flashover. What's more, sleet on the door does not affect the drop-out operation of the "PVD".



"PVD" FAMILY PORTRAIT

"PVD's" meet (nearly) all distribution requirements for closed cutouts.



The 50 amp "PVD'S"	The 100 amp "PVD'S"
"PVD" 56 5 kv, 10⅛" high	"PVD" 515 5 kv, 13¾" high
"PVD" 76 7.5 kv, 11⅜" high	"PVD" 715 7.5 kv, 14¼" high

ONE MINUTE RE-FUSING

Door is unhooked and re-fused in 60 seconds or less. Big knurled knobs, easy to handle even with gloves.

Or 6-second re-fusing

Lineman just opens the door, lifts it off, and hooks on a spare fused door. "PVD" Bakelite doors are interchangeable—you save time when restoring outages.

LINE MATERIAL Fuse Cutouts and Fuse Links

LM

Complete Coordinated Equipment for All Distribution Requirements

7087A

L-M's new Spherolite, Jr.

for better neighborhood lighting at an economical neighborhood price!

The new Spherolite Jr. offers the many advantages of an enclosed luminaire, with shielded light source and good directional characteristics. Its low original and operating costs make it most suitable for residential areas with narrow streets and wide spacings.

Some Important Features

Narrow beam for increased lighting of streets and shielding of residences.

Concentration of light in the main zone, with maximum intensity of eight times the bare lamp value. Main beam at 78° in vertical provides high visibility at wide spacings.

Choice of IES type II or 4-Way light distribution, as shown at left. Refractors easily attached to the specular Alzak reflector with the L-M stainless steel V-Band, which is a positive gasketless seal against bugs, dust, and water. Thus refractors are easily changed in the field, adding flexibility and reducing inventory required for maintenance.

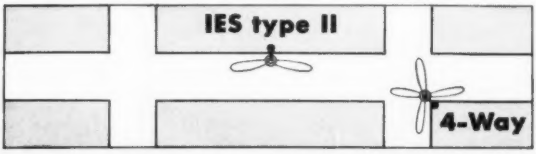
Interchangeability to meet traffic or population growth

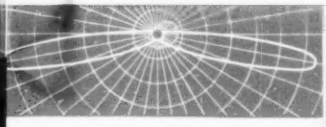
Spherolite Jr. fits the same wide variety of L-M-standardized heads as do L-M's smallest open reflectors and largest enclosed luminaires. Thus changing luminaires usually means simply unlatching one and latching on the replacement—offering a substantial saving in time and material.

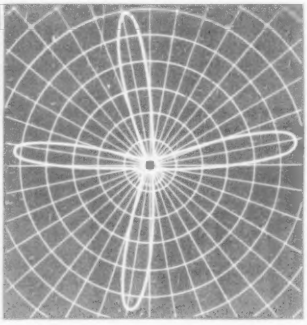
The reflector-refractor assembly illustrated fits any of these: low voltage multiple head; high voltage porcelain head; and, with modified reflector collar, metal series heads up to 5000 volts. The type B head shown is available for either inner or outer wiring, and in either pendent or side mounted style.

Get complete information on Spherolite Jr. and other equipment and L-M Street Lighting Engineering Service ***from the L-M Field Engineer; or write*** **Line Material Co., Milwaukee 1, Wis.**

Two types of light distribution







Choice of two Holophane® refractors which provide either the IES type II pattern shown above, or the 4-Way pattern for intersections at right.

7132

LM

LINE MATERIAL Street Lighting

Complete Coordinated Equipment for All Distribution Requirements

L-M's 3-phase "Round-Wound"

has a single-phase look!

- Three single-phase "Round-Wound" core-and-coil units in one long slim tank
- Superior cooling
- Reduced size and weight
- High impulse strength
- L-M-quality sealed cover and bushings
- Core-and-coil units easily replaced
- Simple, rigid construction
- Meet EEI-NEMA Fourth Report Standards for 3-phase pole type transformers

Take a good look at the clean appearance of this pole-mounted three-phase L-M Round-Wound transformer. Makes a sweet-looking installation!

It's a sweet-working one, too. Famous L-M Round-Wound design gives all the "Balanced Performance" advantages of a wound core that isn't cut, unwound, or disturbed in any way after annealing, with the long round coils wound right onto the core . . . high short time overload capacity . . . better cooling . . . good regulation at all power factors . . . ample insulation . . . high impulse strength . . . mechanical strength.

New cold rolled silicon steels make possible reduced size and weight. We retain all the L-M "Balanced Performance" features. L-M-sealed covers and bushings. Slim vertical types, Round-Wound construction, in 9 to 150 kva. Also available in 225 to 500 kva in conventional horizontal construction. For details ask the L-M Field Engineer or write **Line Material Company, Transformer Division, Zanesville, Ohio.**

Note this sturdy construction!

Three single phase Round-Wound core and coil assemblies, one above and two below, for best cooling and simplified mounting. These assemblies are rigidly held in a strong channel steel frame which dovetails into steel channels welded to inside of tank wall. Coil and tap changer leads are high insulation strength oil resistant cable, guided well away from structural members, assuring high impulse strength.

ROUND COILS WOUND CORE

LM

LINE MATERIAL Transformers

Complete Coordinated Equipment for All Distribution Requirements

Whether you treat or buy your poles

INSIST ON U·S·S CREOSOTE OIL

IT will pay you to standardize on U·S·S Creosote Oil for all pole-treating operations whether you buy poles already treated or operate your own treating plant.

Consistent uniformity of high quality is possible because production of U·S·S Creosote Oil is a continuous operation and not subject to individual batching conditions.

Creosoting is the *proved* method of adding years of extra life to poles by protecting against decay, dry rot, fungus, termites and other wood destroyers. For over twenty years the nation's leading utilities, railroads, contractors, and wood treaters, have been satisfied users of U·S·S Creosote Oil.

If you have a wood-treating operation where Creosote Oil might be of assistance, please feel perfectly free to write.

COAL CHEMICAL SALES DIVISION
United States Steel Corporation Subsidiaries
71 Broadway, New York 6, N. Y.

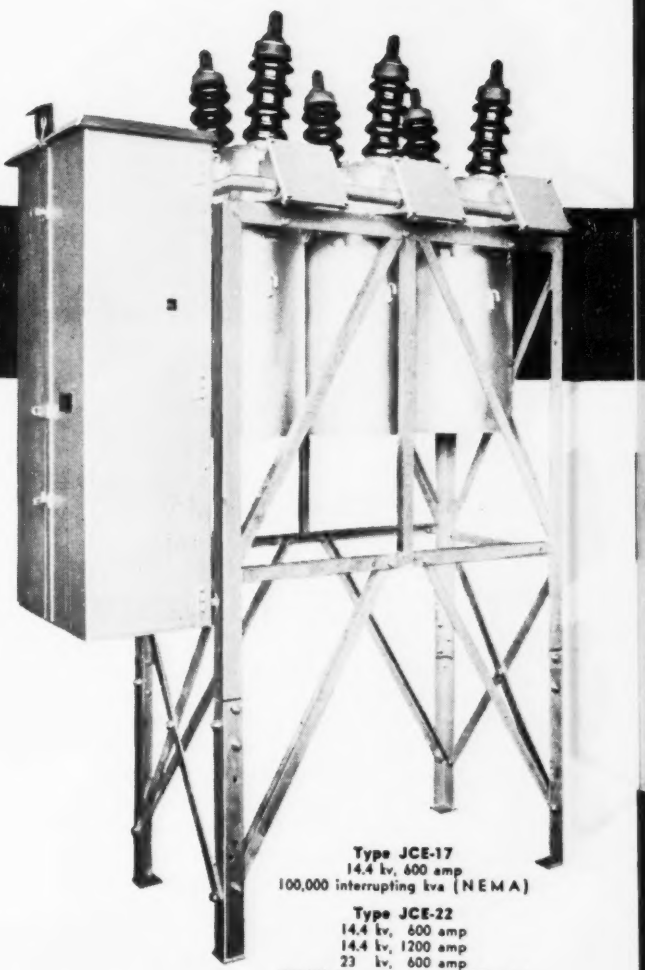
USS **CREOSOTE OIL**

UNITED STATES STEEL

Here's the Stored-Energy Mechanism in a 14.4 kv Oil Circuit Breaker

Outdoor Type JCE-17
14.4 kv, 600 amp
100,000 interrupting kva

A Protective Unit with High-Speed, 3-Reclosures, completely tested and assembled . . . ready to operate



Type JCE-17
14.4 kv, 600 amp
100,000 interrupting kva (NEMA)

Type JCE-22
14.4 kv, 600 amp
14.4 kv, 1200 amp
23 kv, 600 amp
250,000 interrupting kva (NEMA)

—with Motor-Compressed-Spring Operating Mechanism

Conform to AIEE and NEMA Adopted Standards

Low Operating Current—The Motor-Compressed-Spring Mechanism uses only a **small** motor to compress the closing spring. May be a-c or d-c.

Simple Tripping Schemes — Though d-c potential trip provides the utmost in accuracy and reliability, many conditions permit use of a-c series trip with or without overcurrent relays. If a-c is used for the spring-compressing motor, the ultimate in simplicity and low cost is attained.

Rapid Arc Extinguishment — The Pacific Electric Mfg. Corporation exclusive Expulsion Chamber extinguishes the arc with a minimum of oil carbonization or effect on contacts.

Get All Facts . .

Call

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PIERCE G. FREDERICKS, 10 West St., New York 6, N. Y.
J. E. REDMOND SUPPLY CO., 625 W. Madison St., Phoenix, Ariz.
ORMONDE SMITH, JR., 3842 Palm Ave., Houston 4, Texas
MARRS & WENDEGATZ, 526 Dwight Bldg., Kansas City 6, Mo.
L. CLAIR MITCHELL CO., 326 Commonwealth Annex, Pittsburgh 22, Pa.
F. W. GORMAN ELECTRICAL EQUIP. CO., P. O. Box 223, El Paso, Texas
14547 Madison Ave., Cleveland 7, Ohio
G. B. KIRKWOOD, 437 S. Hill St., Los Angeles 13, Calif.
ARKANSAS ELECTRIC CO., 316 Louisiana St., Little Rock, Ark.
WILLIAMSON & WILMER INC., 617 Mutual Bldg., Richmond 19, Va.
LEONARD M. SLUSSER, 318 Dooly Block, Salt Lake City 1, Utah

Other Representatives in Principal Cities

● Experimental laboratory condenser, with water boxes removed, designed by The American Brass Company and tubed with eight different copper alloys, as it appeared after 10-month test, July 28, 1947 to May 25, 1948, at the Marine Test Station of International Nickel Co., at Kure Beach, N. C. *(see above)*.

ANACONDA Cupro-Nickel 754

(10 PERCENT NICKEL CONDENSER TUBE)

MANUFACTURED AND SOLD UNDER U. S. PATENT NO. 2,074,604

Shows High Resistance Under Accelerated Test

TEN months of testing with high velocity sea water at Kure Beach, N. C., demonstrate the superiority of Anaconda Cupro-Nickel 754 (nominal composition, copper 89.25 percent, nickel 10 percent, iron .75 percent) over a number of widely used condenser tube alloys.

The purpose of the test was to determine the resistance of various standard tube alloys to corrosion-erosion type of deterioration caused by turbulent flow of sea water. The tubes are .625″ O. D., 18 gage (.049″), and 61 inches long. The average velocity of sea water flowing through the tubes, during the continuous 10-month test, was 11.7 feet per second. Water temperature varied from 45°F. to 85°F., according to the season of the year.

This test, and performance records where Cupro-Nickel 754 tubes have been in service under severe operating conditions, indicate that this tube and tube sheet alloy will give economical service for central station and marine condensers handling clean and some types of polluted sea waters. The American Brass Company welcomes opportunities to discuss problems relating to condenser tubes, and the services of its Technical Department are available for assistance in selecting alloys to meet specific operating conditions.

ANACONDA
from mine to consumer

Anaconda

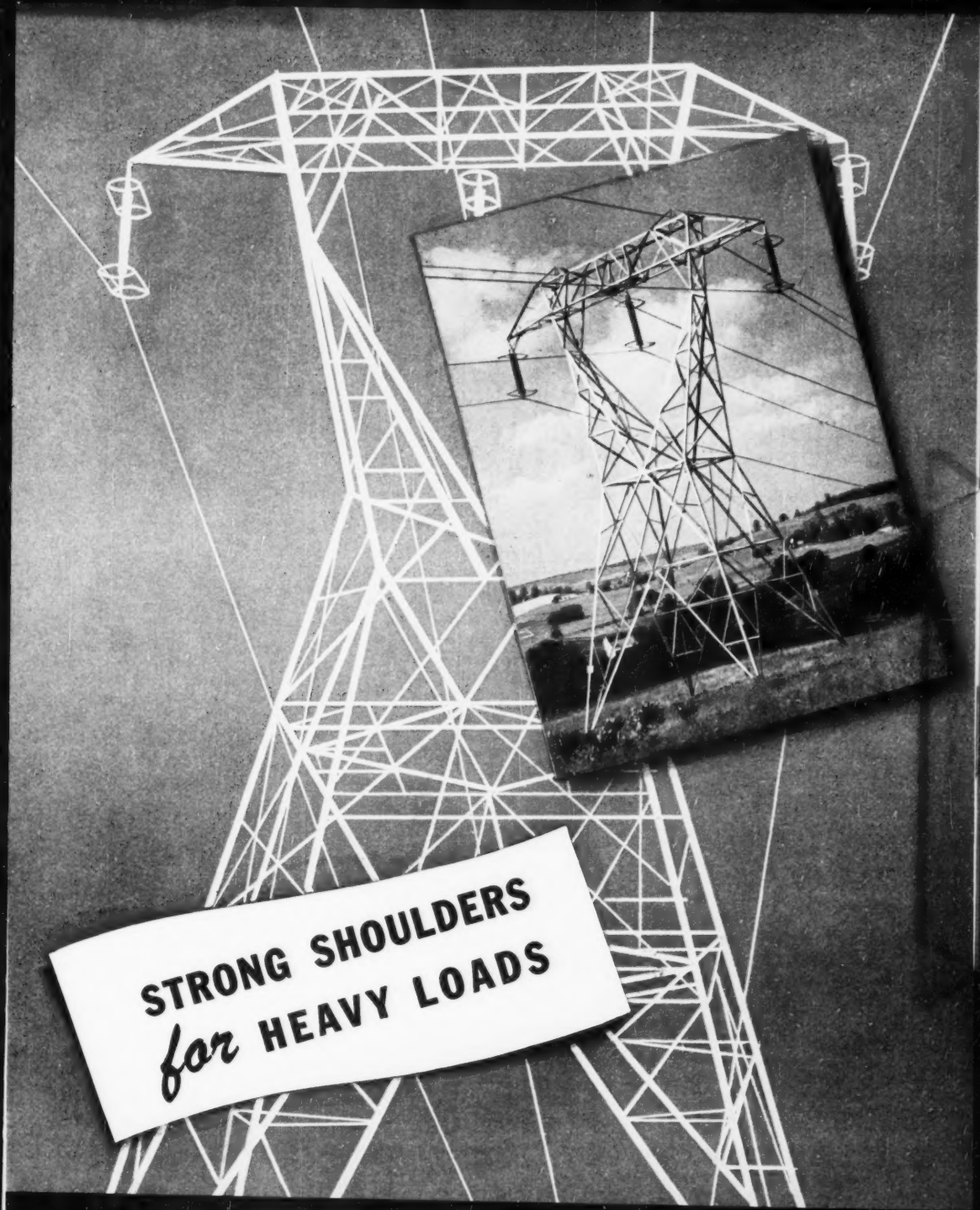
CONDENSER TUBES

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*



BLAW-KNOX TRANSMISSION TOWERS

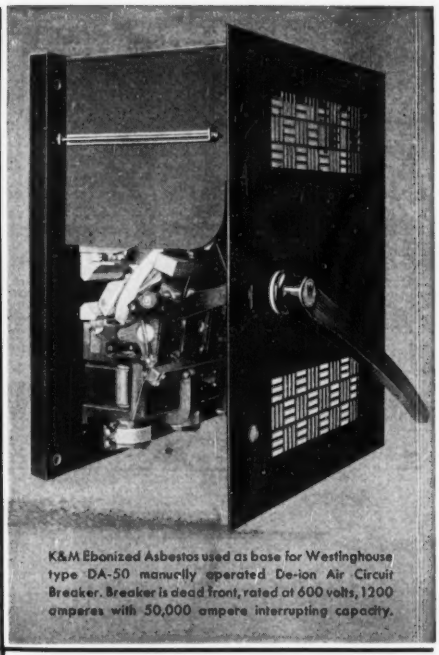
BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY • 2057 FARMERS BANK BLDG., PITTSBURGH, PA.

NEW YORK CHICAGO PHILADELPHIA BIRMINGHAM WASHINGTON

mounted for long service on strong, dependable...

K&M EBONIZED ASBESTOS

electrical mounting material



K&M Ebonized Asbestos used as base for Westinghouse type DA-50 manually operated De-ion Air Circuit Breaker. Breaker is dead front, rated at 600 volts, 1200 amperes with 50,000 ampere interrupting capacity.

One of many excellent features of the Westinghouse De-ion Air Circuit Breaker, shown here, is the base upon which the assembly is mounted. This mounting is made of K&M Ebonized Asbestos . . . a material of exceptionally fine insulating quality and long service life.

Manufacturers have found K&M Ebonized Asbestos ideal for mounting apparatus of widely varying kinds and weights. Engineers specify it for mounting switchboards, bus bar runs, compartment linings, testing tables, bench boards and in other applications. All users choose K&M Ebonized Asbestos because it possesses to a high degree each of the 6 basic requirements of a dependable electrical insulating material . . .

1. Unusually strong—both dielectrically and mechanically.
2. Highly resistant to shock, vibration, temperature changes.
3. Easy to machine, cut, drill and handle.
4. Uniform consistency through controlled manufacturing technique.
5. Versatile in use—supplied in various sizes up to 4" thick.
6. Neat, efficient appearance in finished units.

Ebonized Asbestos is a tough, dense sheet of asbestos fibre and binding cement molded under pressure and impregnated with a special insulating compound. When built into assembled units, it meets the technical requirements of Underwriters' Laboratories, Inc. Write us for further details. We'll answer your inquiry promptly.

Nature made Asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

K&M best in asbestos

In Canada—ATLAS ASBESTOS CO., LTD., MONTREAL, TORONTO, WINNIPEG AND VANCOUVER

New! Improved!..

BLACKBURN *Pole Bottom* GROUND PLATE

REA Approved

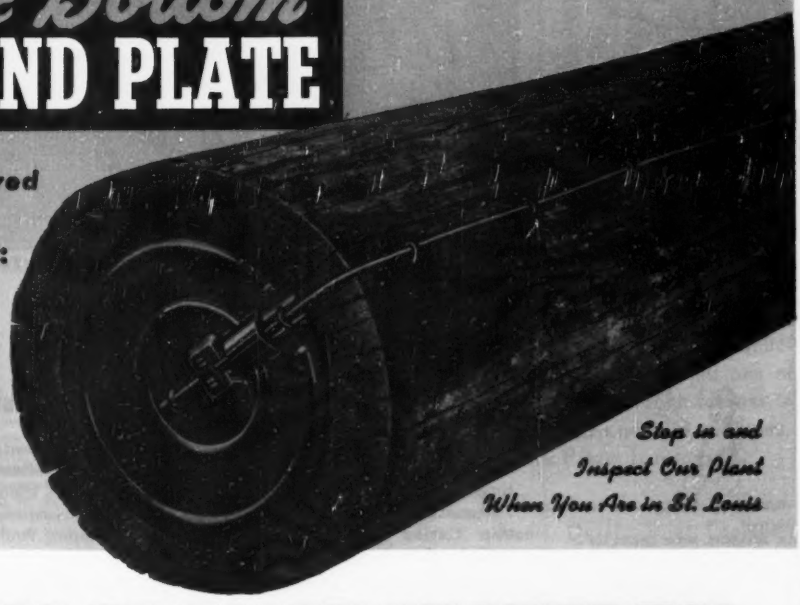
How to Order:

See your Jobber and specify BLACKBURN Pole Bottom Ground Plate.

Catalog Number GP-100
(Made in 1 size only)

Shipping Weight: 40 lbs. per 100

Patented



Stop in and Inspect Our Plant When You Are in St. Louis

3 BIG QUALITY FEATURES!

1. Supplied with double bar connector (one bar on each side of plate). These double bars grip wire tightly and positively—ground wire will not pull off or loosen as pole is set in hole.

2. It's stronger—more rigid—easier to handle—easier to store—easier to install—send for sample and see for yourself!

3. Connector screws are made of high strength Duronze—will not season crack—can be installed tightly without stripping or distorting.

You get all these features and others too—at no additional cost—so specify BLACKBURN Pole Bottom GROUND PLATES!

SEND FOR A SAMPLE AND SEE FOR YOURSELF!

FIRST, MADISON & CLINTON STS. • **JASPER BLACKBURN PRODUCTS CORP.** • ST. LOUIS 6, MISSOURI

BUILDERS OF QUALITY PRODUCTS FOR 15 YEARS!

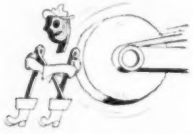
HERE'S WHY NEOPRENE PRODUCTS DO SO MANY JOBS SO WELL

They resist
OXIDATION by air, oxygen, ozone—have outstanding resistance to aging.

They resist
HEAT—are exceptionally stable at temperatures up to 250° F.

They resist
SUNLIGHT AND WEATHERING—in a class by themselves in resistance to rubber's worst enemies.

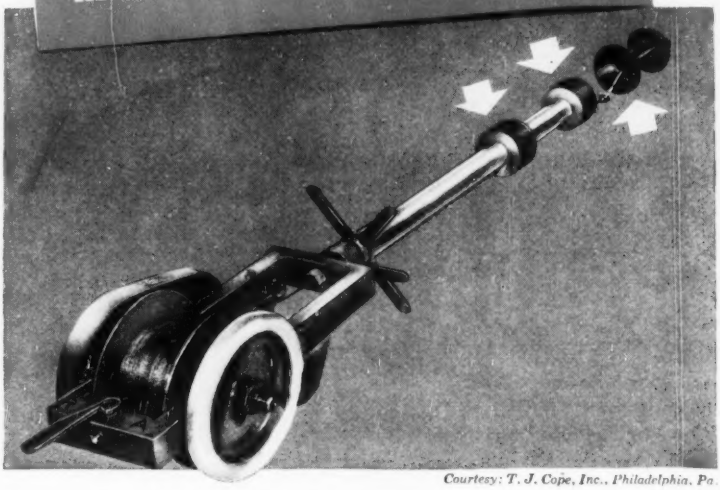
They resist
OILS, SOLVENTS, MOST CHEMICALS—set the standard for oil resistance throughout industry.



They resist
ABRASION, CUTTING, CHIPPING—are tough and durable under severe service conditions.

FREE! THE NEOPRENE NOTEBOOK—Interesting stories . . . new, unusual applications of neoprene. Write E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division G-6, Wilmington 98, Delaware.

Better rubber products are made with Du Pont NEOPRENE



Courtesy: T. J. Cope, Inc., Philadelphia, Pa.

for example . . .

Neoprene parts on new conduit "fish line" resist oils, grease, abrasion

Cleaning underground conduit and "fishing" the cable through it is often a time-consuming, costly job. The Cope Pneumatic Fish Line is designed to do this "fishing" in minutes instead of hours and make possible longer runs between manholes. Since the resilient parts on this tool are vital to its operation, they're made of Du Pont neoprene to assure long, trouble-free service.

On the neck of the unit, two neoprene seals are used. During installation, they are expanded against the conduit to form an air-tight seal. The projectile, which consists of two neoprene cups, is attached to stranded steel wire. This projectile is blown through the conduit by compressed air from a line coupled to the inlet at the rear of the tool. As the projectile shoots through the conduit, it pulls the wire with it. When it reaches the other end, cleaning tools or pulling cable may be fastened to the line and quickly drawn back by the pneumatically operated reel.

Neoprene proved to be the ideal material for these resilient parts. For it resists deterioration from oils, grease, or chemicals often found in underground conduit. At the same time, neoprene withstands constant abrasion, cutting and chipping. And, neoprene's resistance to aging has meant retained resiliency over long periods of time.

Leading manufacturers use neoprene for rubber products that must give long, dependable service where the going is toughest.

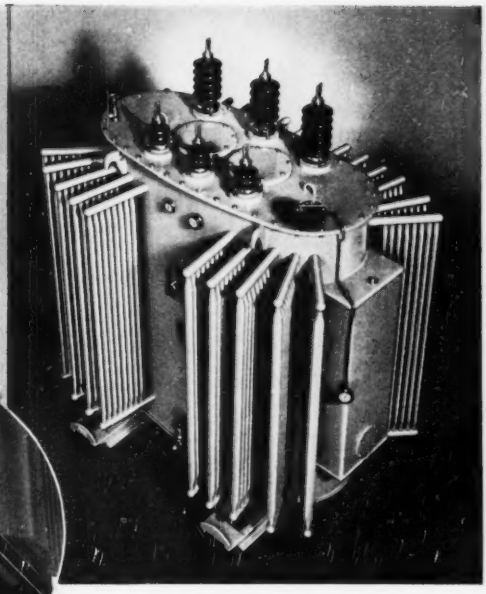
E. I. du Pont de Nemours & Co. (Inc.)
Rubber Chemicals Division G-6
Wilmington 98, Delaware

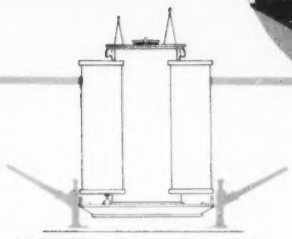
Specify a jacket of
NEOPRENE
The rubber made by
DU PONT
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Pennsylvania STANDARD PARTS POWER TRANSFORMERS

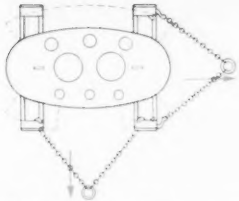
Designed Right... Built Right...

FROM THE BOTTOM UP

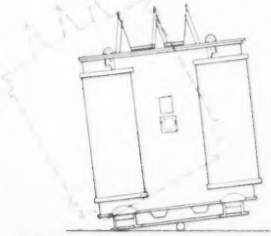




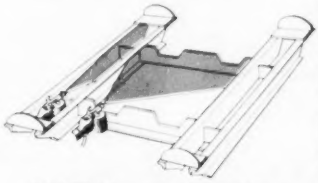
JACKING — Structural steel base members extend to ends of radiators. Radiators offer no interference to jacking. Clearance provided for base of jack to extend under jack lugs. This allows toe of jack to enter all the way under jack lug.



PULLING — Jack lugs are constructed so that a standard hook can be placed in the jack lug to pull the transformer in any direction.



TIPPING — Base design takes into consideration transformer's center of gravity. The largest rolls used cannot tip transformer past its center of gravity.



PAINTING — Ports are provided in base members to ventilate bottom of transformer tank, and to facilitate complete painting of the base and tank bottom. Rust will not attack the tank bottom under these conditions.

Now available in the following sizes:

Three Phase: Up to 10,000 Kva, 34 Kv.
Single Phase: Up to 5,000 Kva, 34 Kv.

A NEW, IMPROVED structural steel base represents one of the outstanding design features in Pennsylvania's new line of Standard Parts Power Transformers.

This base was designed by Pennsylvania Development Engineers after a thorough study of the requirements of a representative group of transformer users. The sketches illustrate how this new base simplifies jacking, pulling, rolling and painting.

Here is another concrete example of Pennsylvania's Engineering Ingenuity.

You'll discover something new if you write for Booklet No. 1492.

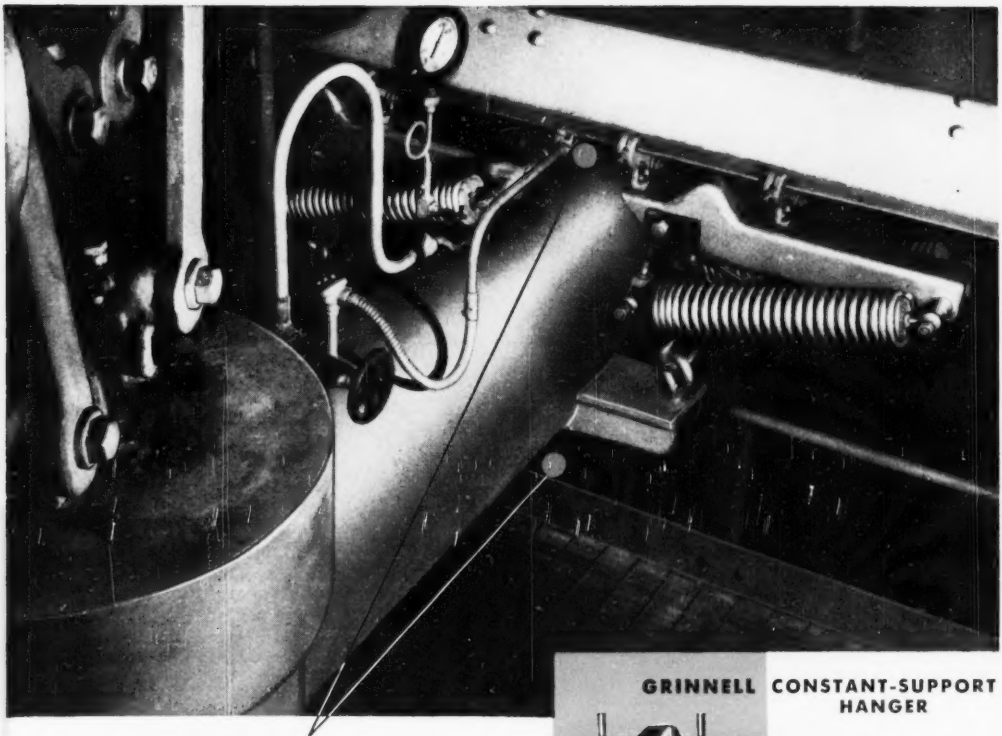
Look to Pennsylvania Standard Parts Power Transformers for *lower prices* and *faster deliveries*.

Inert Gas-Oil Seal

Sealed Tank

Inert Gas Pressure

Pennsylvania
TRANSFORMER COMPANY
PITTSBURGH 12, PENNSYLVANIA



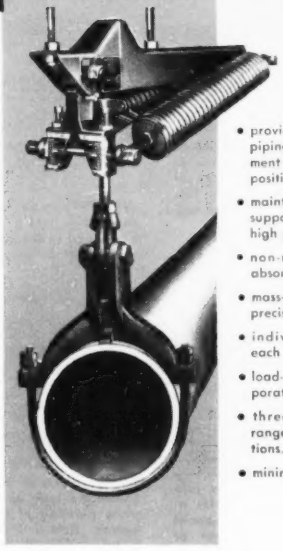
PLAYROOM for a HEAVYWEIGHT

It's a lively chunk of deadweight, this big boiler lead from a superheater outlet at the stop and check valve . . . in the new Southwark station of the Philadelphia Electric Company. It requires "playroom". From its position when cold to its position at 900° F., this piping travels through all three planes — vertical, lateral and longitudinal.

At every point of its travel, the weight of this piping is fully supported by Grinnell Constant-Support Hangers. Yet, because of their compact design, little extra "playroom" need be allowed in which to install the hangers.

Write for the new Grinnell Pipe Hanger Catalog 10-D, containing every pipe hanger, part and accessory, with full instructions for easy selection and correct specification.

GRINNELL CONSTANT-SUPPORT HANGER



the ONLY constant-support pipe hanger

- provides constant support to piping subject to vertical movement — in all "hot" and "cold" positions.
- maintains full safety factor in supporting high temperature, high pressure piping.
- non-resonant and energy absorbing.
- mass-produced from standard precision parts.
- individually calibrated for each installation.
- load-adjustment features incorporated into design.
- three models meet entire range of load-travel specifications.
- minimum headroom required.

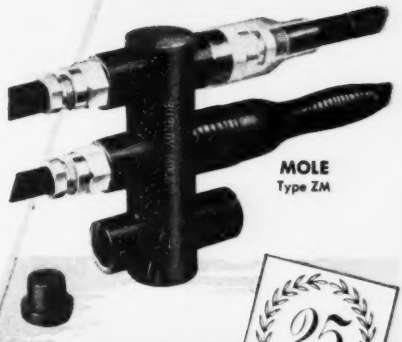
99 YEARS PIPING

GRINNELL

Grinnell Company, Inc., Providence, R. I. Branch warehouses: Atlanta • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston Long Beach • Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

UNDERGROUND

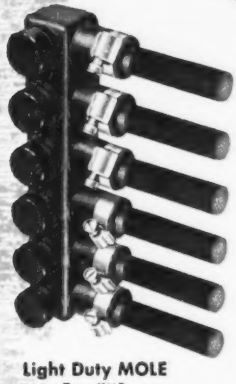
Burndy underground connectors have been time-tested for over a decade in actual service. Preferred because of their rapid installation, flexibility, and low cost. All pre-insulated to eliminate taping wherever possible. Ask for the Mole Line Catalog, or engineering assistance. BURNDY Engineering Company, New York 54, N. Y. WESTERN BRANCH: Vernon 11, California. CANADA: Canadian Line Materials, Ltd., Toronto 13.



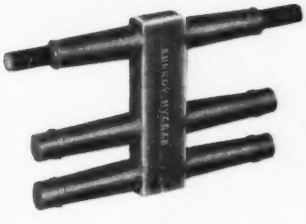
MOLE
Type ZM

25 YEARS OF SERVICE

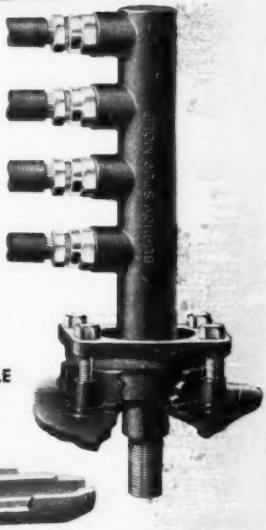
Connect with
BURNDY



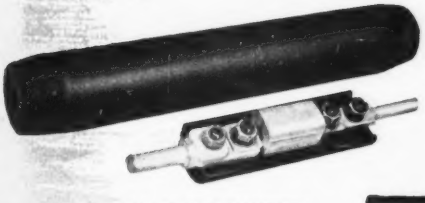
Light Duty MOLE
Type KME



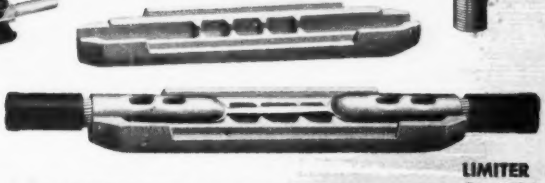
HYCRAB
Type YM



STUD MOLE
Type ZMLD



Replaceable Link MOLIMITER
Type LYM



LIMITER
Type YFS

Save Time on Every Job!

Order ALL Your Insulators and Accessories from Porcelain Products Inc.

Buy all your distribution and transmission insulators and accessories from one reliable source. Round out and complete your stocks with PORCELAIN PRODUCTS' complete line of performance-tested wet process porcelain insulators, and save time on both maintenance and new construction. Ask us to send a representative to discuss your needs. Catalog and price information sent on request.

Porcelain Products, Inc.

PARKERSBURG, WEST VIRGINIA

accuracy

ROCKING CONTACT

with Allis-Chalmers ROCKING CONTACT Generator Voltage Regulator

THEY'RE precision-built like fine watches. Contact sectors are supported in jeweled bearings . . . rock on carefully machined commutator segments heavily plated with silver for reliable, long-life accuracy.

And the Rocking Contact principle offers you instant response . . . low maintenance, too. The regulator operates directly in the exciter shunt field circuit . . . without time-wasting relays. Complex adjustments, vibrating contacts, gliding friction have all been eliminated to help reduce your maintenance problems.

Rocking Contact Regulators are available for both a-c and d-c generators of any size and speed, for either parallel operation or unit control. Call our representative in your nearby A-C office or write direct. A 2584

ALLIS-CHALMERS, 932A SO. 70 ST.
MILWAUKEE, WIS.

Type 366 Rocking Contact Regulator. Hinged glass front door allows easy inspection of moving parts.

ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment From Generation Through Utilization

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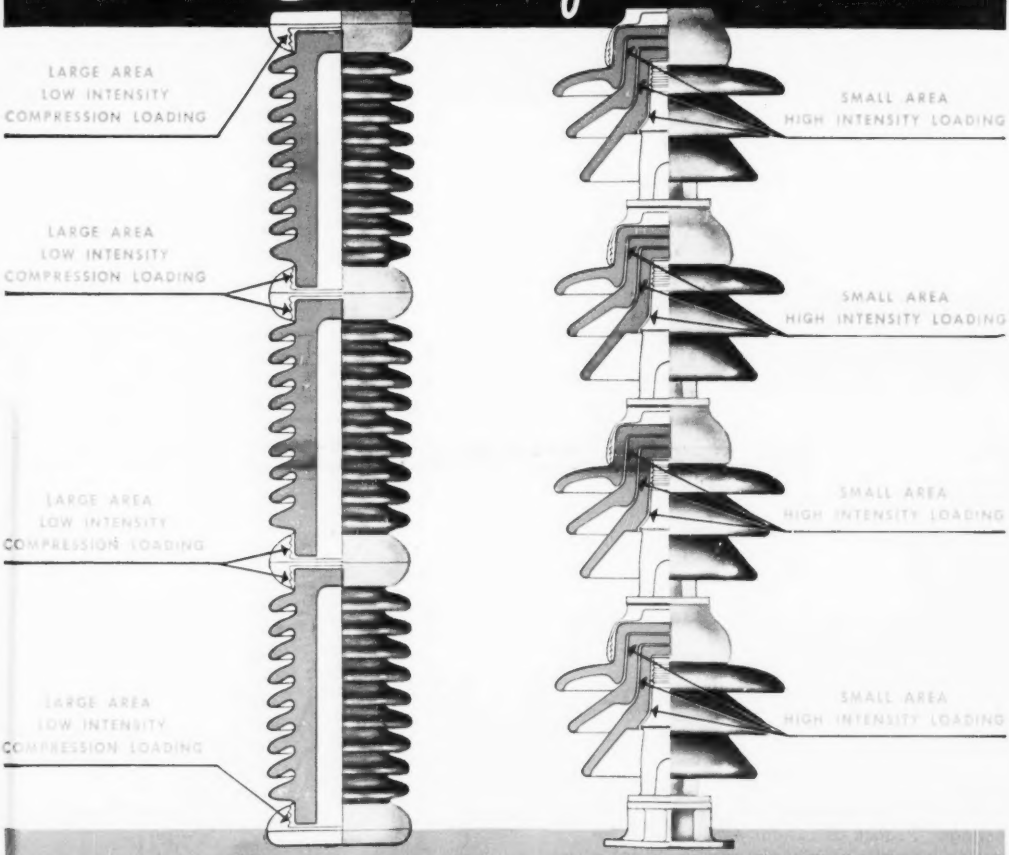

Mechanically and Electrically LAPP STATION POSTS Are The Choice For Switch and Bus Support At 115-161 Kv.

Shown above are a Lapp Station Post for 138-161 Kv, and a conventional pin-type station insulator of the same voltage. From the standpoint of rigidity and permanence compare the Station Post's six large-area low-intensity compression-loading cemented joints with the other design—twelve small-area high-intensity nested-porcelain joints. Which design do you think has the best chance of survival under stresses from thermal change, under torsion load, cantilever load and impact? Why would anybody specify the pin-type design when he can get the security of Lapp Station Posts—up to 161 Kv?

Lapp STATION POSTS

LAPP INSULATOR CO., INC. • LE ROY, N.Y., U. S. A.

for Engineers Interested in Valves and Piping . . . Steam, Water, Oil, Gas, etc.

Here's the Book you've been waiting for:

96 Pages
of Illustrated, Diagrammatic and Tabular Matter regarding . .

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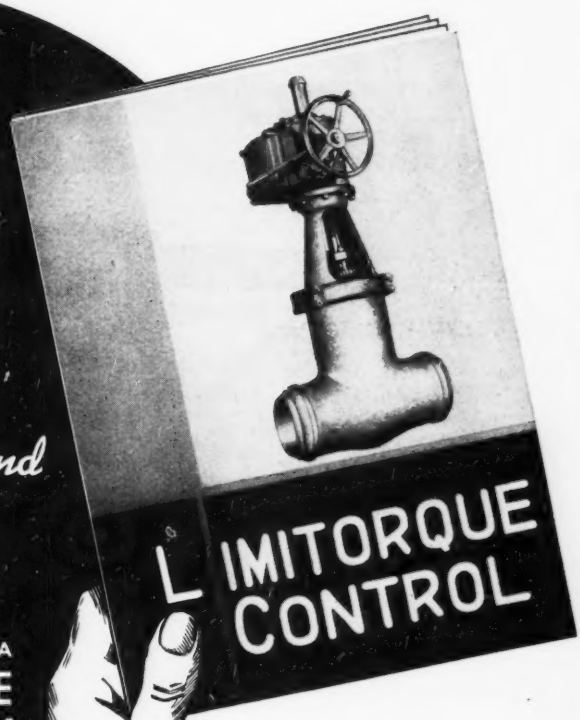

Hundreds upon hundreds of valves on land and sea — for every conceivable use, are being safely, speedily and dependably opened and closed by *LimiTorques* day in and day out.

This catalog shows different types; how they work; how they are connected; wiring diagrams; control panels; floor stands; position indicators; pictures of *LimiTorques* in action in all types of plants; views of *LimiTorques* applied to most all makes of valves, etc.—indeed, a veritable "treatise" on Motorized Valve Operation.

Please be sure to use your *business letterhead* when writing for this valuable catalog.

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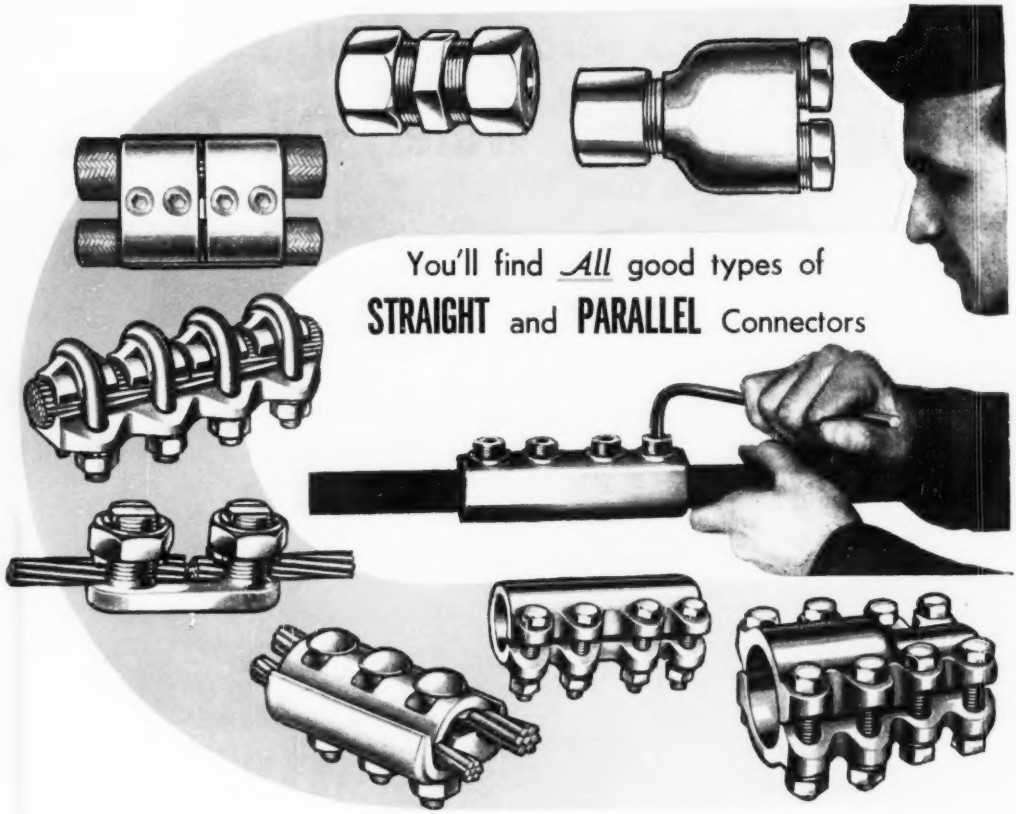

in the *Complete* line

Yes, it's mighty handy to open your Penn-Union Catalog and pick the exact type you need. They're all there—in a complete range of sizes: Bolted straight connectors . . . screw type . . . various split sleeve types . . . shrink fit . . . universal clamps . . . E-Z connectors with yoke and nut, etc.

The Penn-Union Catalog also gives you the *complete* line of Service Connectors, Tees, Cable Taps, Grounding Connectors, Lugs, Power Connectors, etc.

Preferred by leading users—who have found that *"Penn-Union" on a fitting is their best guarantee of unfailing service.*

SOLD EXCLUSIVELY THROUGH WHOLESALERS

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THE *Complete* LINE OF CONDUCTOR FITTINGS

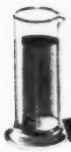
PENN-UNION

How the Alchlor Process makes GULFCREST a superior turbine oil —

1. The Alchlor Process is an extra refining step—weeds out more sludge-forming hydrocarbons than any other refining method.

2. The Alchlor Process imparts a greater ability to benefit from special inhibitors that control oxidation and prevent corrosion.

3. Result: An outstanding oil with long life and unmatched performance records.



In Cylinder 1 you see the oil that will become Gulfcrest. It has already gone through the usual steps used in refining most other turbine oils — but has not yet been Alchlor-processed.

In Cylinder 2 you see the part— approximately 15% — discarded by the Alchlor Process. This is the part that, when allowed to remain in turbine oil, is most likely to oxidize, increase neutralization number, and form sludge, emulsifiers, and harmful acids.

In Cylinder 3 you see the finished Gulfcrest— the incomparably pure lubricating oil that gives outstanding performance and helps you keep steam turbine systems clean indefinitely. To make it even finer, special inhibitors are added to it—they give it still greater stability and protect against corrosion.

Call in a Gulf Lubrication Engineer today and ask him to recommend the proper grade of Gulfcrest Oil to meet the specific requirements of your turbines. Write, wire, or phone your nearest Gulf office.

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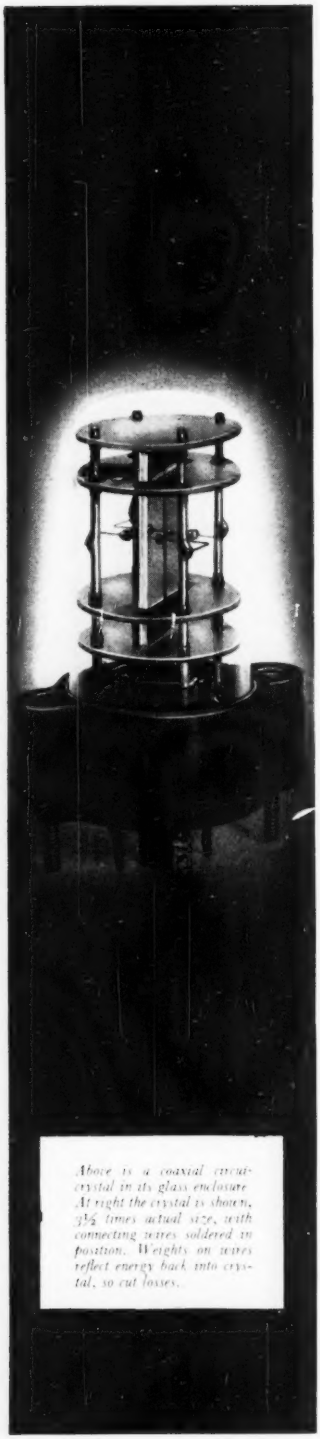
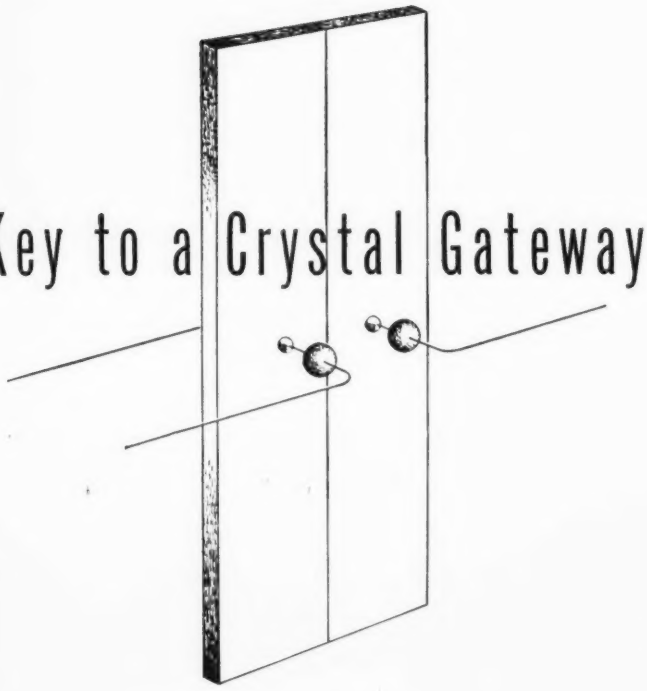


Above is a coaxial crystal-crystal in its glass enclosure. At right the crystal is shown, 3½ times actual size, with connecting wires soldered in position. Weights on wires reflect energy back into crystal, so cut losses.

Key to a Crystal Gateway



How would you solder a wire to a crystal? This must be done for most of those wafer-thin plates of quartz used in electrical circuits. They play a big part in the myriad-channel telephone system that utilizes coaxial cables.

This is how Bell Laboratories scientists solved the problem: A spot of paste containing silver is deposited on the crystal and bonded to it by oven heat. The crystal is then vapor-plated with a thin layer of silver. Then a fine wire is soldered to the spot by a concentrated blast of hot air. The result is a rugged electrical connection to the surface of the crystal which does not interfere with its vibrations.

Sealed in glass tubes, the crystals are precise and reliable performers in the telephone system. Each is a crystal gate to a voiceway, separating *your* conversation from the hundreds of others which may be using a pair of coaxial conductors, at the same time.

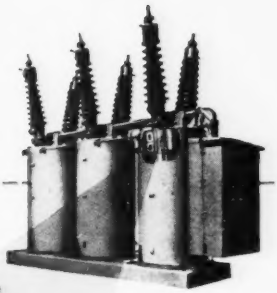
This spot of paste, this tiny wire, this puff of air are among the tremendous trifles which concern Bell Telephone Laboratories in finding new ways to improve your telephone service.

BELL TELEPHONE LABORATORIES

EXPLORING AND INVENTING, DEVISING AND PERFECTING, FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



WESTINGHOUSE BUSHING-TYPE LINEAR COUPLER TRANSFORMERS

SATURATION PROOF

for faster, more reliable bus differential relaying

Get fast, reliable relay protection "built in" your circuit breakers with Westinghouse linear coupler transformers. Installed in the same way as bushing-type current transformers, they provide straight-line characteristics, since there is no iron in the magnetic circuit. Accurate relay settings and performance may be calculated readily by means of a few simple equations.

Linear coupler transformers give you complete reliability at low cost . . . with no additional space requirements. They are applicable to all Westinghouse outdoor oil circuit breakers.

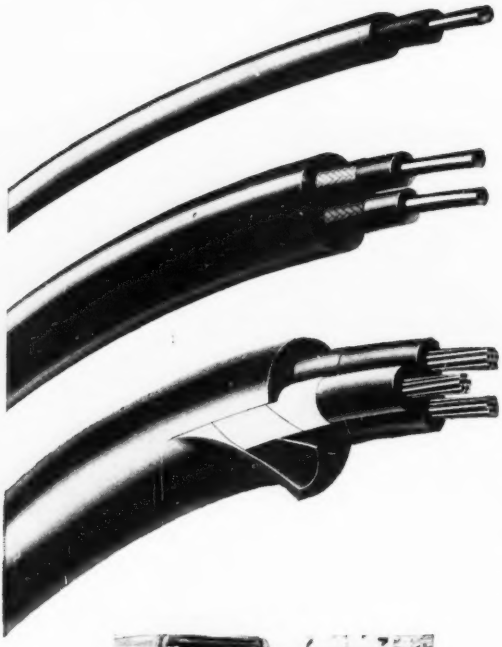
Bushing (Type BLC) and separately mounted (Type LC) linear coupler transformers may be used in conjunction with linear coupler relays for the protection of a single bus to reliably differentiate between internal and external faults.

For complete information on linear coupler transformers, call your nearby Westinghouse office. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60696

For complete information on Westinghouse power circuit breakers ask for B-3686 (up to 69 kv) or B-4012 (115 kv and above).

Westinghouse

POWER CIRCUIT BREAKERS FOR ANY SYSTEM



Choose One Type of Power Cable... Use it Three Ways

Pick Durasheath for power distribution: small size or large . . . one, two or three conductors . . . to carry from 0 to 5,000 volts. Then use this type in any installation you like: buried directly in the ground . . . in conduit . . . suspended from poles . . . or in a run that includes all three. Following are some of the characteristics of Durasheath that give it this versatility:

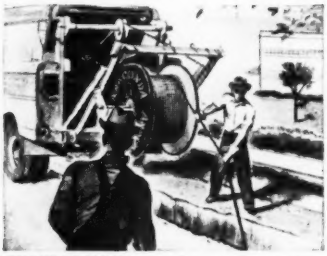
Durasheath is *unaffected by electrolysis*, corrosion and extremes in temperature.

High resistance to oil, flame, abrasion, cutting, impact and the moisture, acids and alkalies found in the soil.

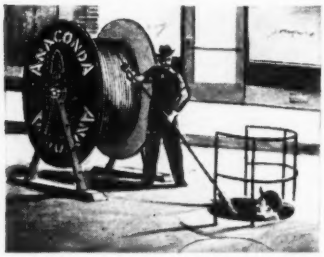
Light weight – greater strength.

More flexible, easier to handle.

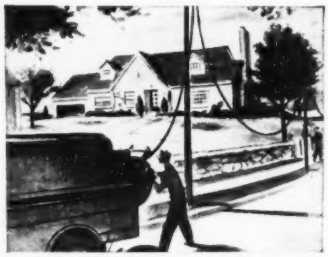
For power distribution between industrial plants, in street lighting systems, airports, mines, railroad signal systems, farm buildings and real estate developments – to mention a few – use Durasheath, the all-purpose cable. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 4923



UNDERGROUND. Toughness of neoprene jacket assures long life of Durasheath when installed directly in the ground.



IN DUCT. Moisture, oil, acid resistance of neoprene jacket make Durasheath an ideal cable for this application.



IN THE AIR. In single or multi conductors, Durasheath truly is a one-type cable for all-type use.

Anaconda **Durasheath**

ANACONDA
from mine to consumer

THE ALL-PURPOSE CABLE

Torque Wrench Tests Prove

KEARNEY Con-Nec-Tites *Tougher*

New Kearnalloy Metal
Gives You Highest "Re-usable Point" in History... *Plus* 80% Conductivity

Since 1926, when the first Con-Nec-Tite made of brass and testing 110 inch pounds was introduced, Kearney has continued to grade up the strength of Con-Nec-Tites. Progressing from brass, to bronze, to copper and finally to the present material, Kearnalloy, there has been an overall increase of 220 inch pounds of torque in the No. 6 size.

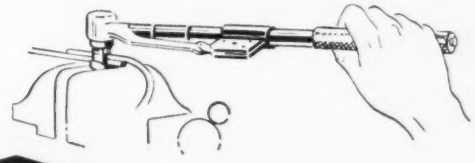
Being the first to introduce a product is only part of being a good supplier—modernizing and improving the original is the true test of the progressiveness of the manufacturer.

The new tough Kearnalloy now being used in the manufacture of Con-Nec-Tites gives you connectors that will take exceedingly high torques without damage and, because Kearnalloy is tough but not hard, you will not nick or otherwise damage your line conductors.

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

See for Yourself

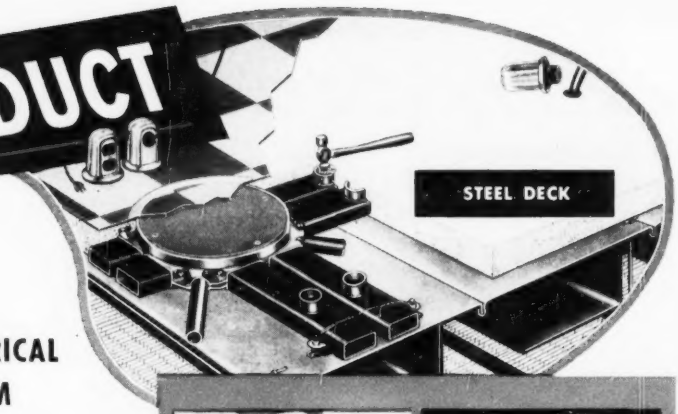
Ask your Kearney representative to make the torque wrench test. He carries a torque wrench with him and is eager to prove the superiority of Kearney Con-Nec-Tites.



Always Specify JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. *for the Job...*

Better Construction · *SAFER* Maintenance

NEPCODUCT



THE STEEL UNDERFLOOR ELECTRICAL RACEWAY SYSTEM

FOR NEW CONSTRUCTION AND MODERNIZATION

Fits ANY TYPE of floor construction

PROVIDES CONVENIENCE OUTLETS AT THE FLOOR SURFACE

New junction box permits installing NEPCODUCT in the upper 2½" of concrete slab or *above steel deck construction.*

- A complete and independent system to meet electrical designs of engineers and for installation by electrical tradesmen.
- Brings outlets—already threaded—to the concrete floor surface.
- Eliminates cutting the permanent structure and boring through raceway to establish service connections.
- Reduces cost of electrical extensions and maintenance through easy accessibility to services in junction boxes and outlets.
- Ample outlets and circuit capacity for telephone, communications, light and power.

Steel for permanence Grounded for Safety

Let us send you complete service and installation data on NEPCODUCT Underfloor Wiring Systems and Service Fittings.

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NATIONAL NE WIRES AND CABLES

The EEI-Industry Job Ahead

ONE YEAR you have inflation and an industry split over the public information issue. The following season, it's recession and the prospects of an ex parte federal investigation concocted politically for purposes of reprisal. You don't even get your choice.

Wondering what would be the thoughts, policies and programs of EEI's new leader, ELECTRICAL WORLD asked President Elmer Lindseth, of the Cleveland Electric Illuminating Co, to comment on the year in which he will represent the industry through its leading association.

The industry's problem—this year, next year, any year—as Lindseth sees it, is to render its service ever more efficiently to its customers. That obligation, the industry's only reason for existence to be sure, is also its opportunity.

And how is so broad a problem to be approached? Well certainly, economy will be one necessity. Economy in design, construction and operation of electric power facilities was vital in last year's inflation. It is no less so this year, when prices remain high but money tightens.

Aggressive selling is another avenue by which Lindseth sees the industry approaching its goal. Volume economics are the essence of the business. What could be more logical than hard selling?

Retaining and deserving the goodwill of the public ranks next in the new leader's prescription. Only this will permit proper rate levels. And how can one render efficient service if the customers' attitude supports harassment?

A fourth avenue for ever more effective service lies in earning an adequate return for investors. Every utility executive knows the wisdom of this point. By the record, a majority of regulators do, also. No customer who knows anything of how power is generated and distributed could fail to recognize this as basic. Good earnings must precede new venture capital. But the industry has a major task here, if the additional earnings for new stock reported in ELECTRICAL WORLD's latest Statistical Issue are valid.

Halting the momentum toward government ownership and operation of electrical facilities is still another means of rendering ever more efficient service. The federals won't like it, perhaps, but they hold small responsibility for the fact that the United States has and has had the world's finest electric service. That they have no more power responsibility than they have is due in large part to the effectiveness of private electric service. What better way is there to keep power free of statism than to keep it effective?

Finally, Lindseth sees building now for the future as a tool for more efficient electric service. The plant has been expanded and will grow further. The investment will grow, and the employees with it. So will the shareholders and the earnings. Because utilities are so dependent on the people who man them, effective employees stand second to nothing in importance.

What of the man who leads the industry during the forthcoming year . . .

"I'M A BENEFICIARY of the capitalistic system." Lindseth says when he's pressed about it.

From his birth at Chicago, in 1902, through his graduation from a Cleveland high school 16 years later, the benefits capitalism showered on this first-generation Swedish-American were routine—public schools, paper routes, a $3 per week job delivering groceries, and three summers at $22 and $30 monthly as an office boy.

But toward the end or his sixteenth year, capitalism, with an assist from Lindseth to be sure, began to shower down. He won a scholarship to the Case Institute of Technology. Two years later, he transferred to Miami University, whence he was graduated in another two years. Then he returned

to Case on a fellowship. In 1925, he was graduated with an engineering degree—and the highest four-year scholastic record in his class. The next year was spent at Yale, again as a beneficiary of capitalism through a teaching fellowship. It yielded a Master of Science degree.

His seven years of higher education had been financed jointly by capitalism and Lindseth. Capitalism, through the bequests supporting the scholarships, had paid the fees. Lindseth chipped in with the scholastic endeavor necessary to win and hold the awards and the spare-time work necessary to support himself. Lindseth regards the whole process as eminently a bargain. Quite possibly, his managerial addiction today to employee training and advanced education began during these years.

Still, the woods are full of well trained, capable young men with sound achievement records who have gone to work for large corporations. One way or another, those who become corporation presidents must get ahead of the pack and stay there.

"I got the breaks," says Lindseth candidly.

OPPORTUNITY: The Boss Was There

The first came at Yale. There, Walter Wohlenberg, now Dean of Engineering at New Haven, let Lindseth help on a highly technical ASME paper. After its completion, Lindseth went to work for Cleveland Electric Illuminating as a boiler test helper, a job he'd been doing each summer since 1924. The paper was presented by Wohlenberg at the December ASME sessions that year, 1926.

"Wohlenberg," says Lindseth with characteristic intensity, "did an extremely generous thing. He did the routine presentation of the paper. But he let me get up on the stage and discuss it, answer questions. And CEI's chief power plant engineer was in the audience."

What CEI's chief power plant engineer heard must have impressed him. In 1927, a year after he had gone to work, Lindseth's immediate boss quit, and Lindseth became production engineer. In one year, he had gained a step on the pack. He never lost it.

OPPORTUNITY: To Move "Downtown"

Lindseth stayed on that job 10 years, compiling a record which finally brought him "downtown." It was an era when power plant men were learning how to load turbines for maximum effectiveness and economy, when they were mastering the true capabilities of their equipment; when they were perfecting the operating techniques which were so valuable in the last war. The job was done all over the land, by many systems. In Cleveland, that job was Lindseth's. The men who helped him do it so well still speak of his record with admiration. The record was sound enough that when CEI's President Crawford had a particularly special assignment, Lindseth was called. He's been "downtown" ever since.

Successful completion of that first "downtown" assignment put Lindseth on the broadening path which has become so necessary to the fabrication of today's industrial managers. He came to CEI as an engineer, but before he'd been downtown very long, Lindseth was a staff researcher, took charge of a highly important rate case, became a pair of hands that picked up and solved numerous problems besetting Crawford. Again the performance was good. It led to the vice-presidency in charge of sales, a wholly new field. Instead of the engineering journals, Lindseth began reading sales and promotional literature as he rode to and from work on Cleveland's "Rapid Transit." He learned the new lessons well enough to become executive vice-president in 1945, and president and director a few months later, on Crawford's death. But the broadening process went on.

OPPORTUNITY: To Bear Heavy Burdens

For example, CEI was separated from the North American Co not long before the power business plunged into the largest single expansion program of any United States industry. Traditionally, operating utilities got their financial brains from the holding companies. CEI needed a top level financial man and it needed one fast. The assignment went to the man who'd been titrating boiler feed water 20 years before, devising operating techniques 10 years before, negotiating wartime power supply contracts five years before.

As top man of CEI's 600-odd managers, Lindseth bears responsibility for 5,600 employees, $250,000,000 in assets, 35,000 security holders, 400,000 customers, and an expansion program which cost $33.25 million last year, $34 million this year. Of all these requirements, perhaps the one on which Lindseth spends most time, by choice at least, is that concerning the employees. Certainly the men around him, when asked about those accomplishments which have been purely Lindseth's since he became president of CEI, speak more of employee relations than anything else.

There was, for instance, a welding of the top management group into an executive staff which works collectively in guiding all the company's operations. CEI's employee education program, utilizing Cleveland's higher education facilities as well as company talent, is another.

OPPORTUNITY: Keynote of the Industry

This concentration on effective employee selection, training, and organization ties intimately into Lindseth's conviction that the electric utility busines is an outstanding latter-day source of opportunity for young men. The power business, Lindseth declares fervently, needs capable young men. It can offer them opportunity, he is equally certain, which would be hard to match elsewhere. This belief arises from the startling expansion of facilities, power's basic position, its growth possibilities as indicated by every assessment of the future, and the need for executive timber to replace the oldsters now holding most of the top jobs. Lindseth reiterates a survey he caused to be made two years ago. It showed that 85% of the top five executives in U.S. power systems will face retirement by 1962. And it showed that, during the same period, the prospective expansion will be so great that expansion itself would vastly broaden the need for new managerial talent.

Probably most important today in Lindseth's thinking is that his industry offers rare opportunity for so many others to become "beneficiaries of the capitalist system."

The Electrical Week

Union Electric Co's Community Relations Program, which included a campaign to stop precipitation of fly ash from its steam power plants, won it the 1948 Charles A. Coffin Award. The medal was presented at the 17th Annual Edison Electric Institute convention in Atlantic City . . . Awards in three other fields were given at the meeting, for Planned Lighting to Pennsylvania Power & Light, West Penn Power, New Orleans Public Service, the Claude L. Matthews Valor Award to Ray R. Nabors, and the Reddy Kilowatt Annual Report Award to Pennsylvania Power & Light . . . Expansion of resources and service improvement with a careful eye on the economic problems involved was urged by R. E. Mittelstaedt, president of the California Public Utilities Commission, at the Pacific Coast Electrical Association Convention . . . And in Washington, Agriculture Secretary Brannan's new $3 billion farm program for the Missouri Valley looked like a body blow to the proposed MVA.

The Rural Electrification Administration has made more loans to Texas groups than to those in any other state, $151,134,846. Nevada trails the 45 states in which loans have been made, with $326,000.

Tennessee Valley Authority is terminating many contracts with private power companies because of increasing needs in Tennessee and northern Alabama.

The continual drop in the price of non-ferrous metals will be welcomed by electric utilities. Most have extensive improvements or extensions planned for their transmission and distribution systems.

Through Mar 31, borrowers from the Rural Electrification Administration had already repaid the government $193,733,159 on principal and interest.

Production of electric washing machines in the first two months of 1949 was at a rate only 50% as high as that for 1948.

True but Exaggerated Dept—The United Press, quoting the Federal Power Commission, emphasized that home electric light bills were going up in many cities. The increase for 100-kwhr bills during the past year was from $3.64 to $3.68.

The Bureau of Reclamation is going to show Eastern taxpayers where some of their taxes have gone. Motion pictures have been taken at Grand Coulee Dam showing operations in the power houses there. The pictures are to be televised by Eastern stations.

Based on March consumption, electric utilities had a 100 days' supply of coal on hand Apr 1.

Of the stores modernized since the war, 54% installed fluorescent lighting, 17% incandescent, 9% slimline, and 5% cold cathode. Where the three less popular lighting methods were used, it was in conjunction with fluorescents.

The Scottish Electricity Board is experimenting with wind power for driving electric generators.

Nearly $500,000 will have to be spent by Boston Edison Co in rerouting duct and cable lines along with distribution circuits in connection with the construction of a $27 million bridge across the Mystic River connecting Charlestown and Chelsea.

Utilities are using more gas and oil, less coal. Gas consumption in March was 17.8% more than in March, 1948, oil consumption was 8.4% more, but coal use was down 6.2%.

An experimental radar installation at El Paso, Tex., has proved successful in detecting approaching storms as far as 50 miles away.

Notes From The News

Representatives of Seattle, Tacoma, and the public utility districts of Washington have agreed on plans for an engineering study upon which to base a program for acquisition of Puget Sound Power & Light Co properties . . . Georgia Power Co is preparing to sell its bus transportation system . . . The Electric Power Board of Chattanooga is now serving over 60,000 customers. Average residential use is now 4,396 kwhr a year . . . Something of a record was set recently at Miami, Fla., when a jury awarded an employee of Florida Power & Light Co $260,000 in a damage suit against the utility. The man claimed that he became impotent as a result of an accident. The verdict will be appealed . . . The Kentucky Public Service Commission has granted four Lexington utilities the right to deny service to new subdivisions until they are definitely mapped out . . . Bonneville Power Administration plans to establish a branch office in Montana

Continued on following page

PRESIDENT TRUMAN awaits signal to press key putting into operation another 108,000-kw generator at Grand Coulee Dam. Russell McMullen, assistant chief of transportation and communication at the White House, is timing the job. Congressmen in background, left to right, are Republicans Walt Horan, Washington, and Lowell Stockman, Oregon; and Democrats Hugh Mitchell, Washington, and Henry Jackson, Washington, representing the Grand Coulee area

if its Montana substation and transmission line are approved by Congress . . . The Georgia Court of Appeals has ruled that a power company can be held liable when a home burns because of faulty electric installations.

Wisconsin Public Service Corp has joined Trees for Tomorrow, Inc, a Wisconsin group dedicated to spreading the gospel of reforestation . . . A member of the crew of the Canadian aircraft carrier Magnificent apparently doesn't like meters. He broke into the Meter Department of Nova Scotia Light & Power Co at Halifax and broke 16 of them in addition to other electrical equipment . . . Three employees of the Pennsylvania RR at Pittsburgh have been arrested for the greatest bulb-snatching job in history. They are charged with having stolen 250,000 bulbs in the past three years. Their system was simple. They requisitioned the bulbs from a company warehouse and then sold them to dealers as salvaged merchandise . . . The most thoroughly read industry publication this week was the UNCONVENTIONAL DAILY, *a tabloid newspaper published by* ELECTRICAL WORLD *for delegates to the EEI convention at Atlantic City.*

The Missouri Supreme Court has ruled that the Union Electric Co must pay library taxes assessed by the St. Louis County Library District for support of a free county library . . . The Potomac Edison Co, Hagerstown, Md., has won a lawsuit over the right-of-way for a transmission line. The line had been up for more than 20 years when the owners of the land complained. The court ruled that this was "an easement by prescription" . . . Tennessee Valley Authority has announced its payments in lieu of taxes to seven Tennessee Valley states and certain of their counties will total $2,050,437 for the fiscal year ending June 30. TVA also estimated that municipalities and co-ops distributing its power will pay taxes and make payments in lieu of taxes amounting to approximately $2.5 million during the 1949 fiscal year.

Indianapolis Power & Light Co has submitted a bid for city service to Indianapolis calling for a 23% increase. . . . Jacksonville, Fla., City Council has agreed to continue taxes on utilities bills another year. . . . Harrisonburg, Va., has been authorized by the Virginia Corporation Commission to purchase the assets of the West Harrisonburg Light Co. . . . Local 3, International Brotherhood of Electrical Workers, and employer-members of groups affiliated with the Joint Industry Board of the electrical industry are planning a 2,000 apartment non-profit housing development in Queens Borough of New York City.

Construction:

Tennessee Valley Authority has started construction of its New Johnsonville steam plant. The 400-acre site is on the east shore of Kentucky Reservoir, 66 miles west of Nashville . . . Los Angeles Department of Water & Power will spend $51,820,000 next year to increase the output of its power system if its proposed budget is adopted . . . Grand Coulee Dam is now the largest producer of hydroelectric power in the world. Since the tenth generator was put into operation last week by President Truman, capacity of the plant is 1,100,000 kw . . . El Paso Electric Co has put into operation a 20,000-kw unit at its Rio Grande Plant.

Financial:

Telluride Power Co, Salt Lake City, has asked Federal Power Commission permission for issuance of $300,000 in 6% cumulative preferred stock. A total of 3,000 shares at $100 par would be offered. . . . First quarter results indicate that 1949 earnings of American Gas & Electric Co will be better than in 1948, Pres Philip Sporn reports. Gross revenues for the quarter are nearly 21% above the same period in 1948, and the balance for common stock is 14.3% ahead of last year. . . . Commonwealth & Southern Corp reduced its outstanding loan indebtedness to $3 million with the payment of $3 million for the second quarter of 1949. The loan, from a group of New York banks, was made in July, 1948.

Community Relations Program Wins

Union Electric Co Receives Coffin Award for 1948; Campaign to Eliminate Fly Ash Precipitation from Steam Plants Most Dramatic Aspect of Entry

"COMPLAINING letters and telephone calls suddenly fell away from several every day to the point where months passed without a single acrimonious call."

There, in a nutshell, is half the story of Union Electric Co's campaign against the precipitation of fly ash from its steam power plants. It's the last half of the story. The first half lay in the company's strenuous efforts to make sure that its power plants did, in fact, stop spreading fly ash. Having corrected the situation, UE undertook to correct the belief of area residents, newspapers, and officials that the company was to blame for the problem.

Coffin Medal Presented

Union Electric's fly ash program—was successful enough to win it the 1948 Charles A. Coffin Award. Presentation of the medal was made this week at the 17th Annual Edison Electric Institute convention.

"The judges of the Coffin Award for the current year had a very difficult problem in deciding the winner of the award because each of the four contestants submitted presentations of outstanding accomplishments," President Acker declared in making the award. "All demonstrated a keen realization of their fundamental responsibility for public welfare and of the many factors that enter into carrying out that responsibility. All showed a high degree of managerial skill and foresight and are entitled to a well-merited Honorable Mention."

Other Contestants Named

Other contestants for the award this year were Cincinnati Gas & Electric Co, Detroit Edison Co, and Southern California Edison Co. The award is made annually by the General Electric Co as a tribute to the memory of Charles A. Coffin, GE's founder and a pioneer in the electrical industry.

Union Electric's victory in the 1948 competition was won by its Community Relations Program. Examples of the specific community benefits which have flowed from this program studded the UE entry. The fly ash elimination program was only one—though perhaps the most dramatic—phase of the community relations work. Others were UE's $400 million postwar expansion program, indispensable to the area's growth and prosperity; a frequency conversion job in Keokuk, Iowa; the assistance that company employees and facilities lend the community in times of distress—inhalators, additional radio cars and facilities, educational equipment, and a host of others.

JUDGES STUDYING an entry for the Charles A. Coffin Award are Ernest R. Acker, left, president of Edison Electric Institute; Dr James R. Killian, president of Massachusetts Institute of Technology; and Charles W. Kellogg, past-president of EEI

At one point, the company's discussion of the fly ash problem asserted, "atmospheric dust, fly ash, and Union Electric became almost synonomous terms." But today, after the company's having discovered and admitted the share of the blame which rests upon it, having studied the problem thoroughly and spent the money necessary to eliminate UE's fly ash contribution, "the standing of the Company in the community has been reversed from a position of direct or implied distrust to one of not infrequent commendation from opprobrium to approval."

The award for 1948 was the first to be made under a revised set of rules governing the Coffin Award. Hitherto, all electric light and power companies had been invited to submit presentations in the competition. Such presentations were to cover all fields of a competing company's activity. That proved to be expensive, and it brought forth fewer entries than might have been made, because of the reluctance of some systems to nominate themselves.

Under the revised rules, a nominating panel is constituted of the chairmen of 13 EEI committees, plus six members at large appointed by the Institute's president. Each panel member is asked to submit by Dec 15 of each year his nominations for the award. Each is to present three companies, in order of merit and exclusive of his own company, which have made outstanding accomplishments during the contest year. The accomplishments are to be specified. In general, they are expected to lie within the particular sphere with which the nominator is most familiar. Thus, achievements in all branches of the electric power supply art are subject to annual review for Coffin Award recognition, for the EEI committee chairmen cover engineering and commercial activities, accounting, rates, rural, accident prevention, and industrial relations.

The nominations, when complete, go to a review panel of three members selected by the president of EEI. For the 1948 contest, this panel consisted of Ralph H. Flynn, publisher of ELECTRICAL WORLD; George C. Tenney, editor and publisher of *Electrical West*; and P. B. Garrett, editor of *Electric Light and Power*. This panel is to evaluate the nominations on the basis of ratings which take into account the number of each company's nominations and the order in which they rank, and the importance to the industry and the

public of the accomplishments cited for each company. The panel reports the names of the five companies standing highest on the list. These five companies are then invited to submit presentations in competition for the award.

Final judging of the presentations is done by a committee of judges consisting of the president of EEI and two others. Judges for the 1948 contest were President Acker, C. W. Kellogg, a former president of the Institute, and Dr James R. Killian, president of the Massachusetts Institute of Technology.

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Business Must Be Big Regardless Who Owns It

Business must be big. If it were small it would be unable to finance many of the industrial enterprises required for our national economy. If big privately owned corporations are wiped out, they will only be replaced by big government-owned enterprises.

This was the message Charles E. Wilson, president of General Electric Co, delivered this week at the annual convention of the Edison Electric Institute at Atlantic City (Other speeches are abstracted later in the book).

To take away the economic power of large corporations, Wilson said, would bring these results:

1. Fewer corporations able or willing to take large economic or technological risks.

2. Less stability of prices.

3. Fewer opportunities in private business for career employment or lifetime employment, followed by an assured pension.

4. Less basic or fundamental scientific research by private industry.

5. Fewer adequate-sized private companies on which the armed services of the nation must be able to count in case of war.

"The natural consequence of a planned destruction of the economic power of private corporations would be the transfer of that power to government," Wilson said. "It would not actually be destroyed. We would then have big government corporations. Today the people have recourse against monopoly and inefficiency in private business; and they do not hesitate to act upon it, sometimes in the courts, but more often and more savagely in the marketplace. They should remember, before it is too late, that there is no recourse against government monopoly and inefficiency—no recourse but one, that is, and it is the kind of cure that finds the patient stone cold dead in the market."

Utilities Honored for Achievements; 4 Awards Presented at EEI Meeting

ELECTRIC UTILITIES this week (June 2) reaped their rewards for outstanding achievements in various fields during 1948. In Atlantic City, H. M. Sawyer, Prize Awards Committee chairman, made the presentations at the third general session of Edison Electric Institute's annual convention.

The four awards presented were the Charles A. Coffin Award, The Planned Lighting Award, the Claude L. Matthews Valor Award, and the Reddy Kilowatt Annual Report Award.

The Charles A. Coffin Award, sponsored by the General Electric Co, was won by the Union Electric Co of Missouri (See preceding page). This award is presented annually to the electric company making "the greatest advancement in its operation and physical plant, thereby making a distinguished contribution to the development of electric light and power for the convenience of the public and the benefit of the industry."

Pennsylvania Power & Light Co won the over-all Planned Lighting Award for the electric company achieving the best promotional and educational activities in the residential, commercial, and industrial lighting fields. The award is a joint one of EEI and the Better Light Better Sight Bureau. The winner received a bronze plaque and $500. Smaller awards were:

Residential Lighting—West Penn Power Co, first; Pennsylvania Power & Light, second.

Commercial Lighting—New Orleans Public Service, Inc, first; Duquesne Light Co, second.

Industrial Lighting—Pennsylvania Power & Light, first; Dayton Power & Light Co, second.

Judges were Edward J. Ingram, sales manager, Metropolitan Edison Co; Reading, Pa.; Frank R. Innes, associate editor, ELECTRICAL WORLD; and Marshall N. Waterman, assistant manager, Illumination Department, Westinghouse Electric Corp.

The judges commented upon PP&L's series of "Planned Lighting Clinics," held throughout its territory to train local contractors, retailers, and others in the technique of modern lighting installations, and also upon its aggressive use of Planned Lighting promotional and educational materials.

"For high fidelity to duty by courageous action at great personal risk to himself in preventing a long power failure" Ray R. Nabors, boiler operator of the Kentucky Utilities Co, received the Claude L. Matthews Valor Award.

Nabors was on duty at the Tyrone Plant of the company, in charge of the two 150,000-lb-per-hour boilers, which operate at 900 lb pressure and 850 deg superheat, when the tube failure occurred. He was in the path of the escaping steam and water but threw himself on the floor and moved through the darkness to the panel board. From memory he operated the switches and removed both boilers from service.

The award is sponsored by the W. N. Matthews Corp.

Pennsylvania Power & Light won the Reddy Kilowatt Annual Report Contest and the bronze plaque for the company whose (1948) annual report "best humanizes, illustrates and dramatizes its company's operations to the stockholders."

Honorable Mention Certificates were awarded these companies: Arkansas Power & Light Co, Central Arizona Light & Power Co, Florida Power Corp, Puget Sound Power & Light Co, Shawinigan Water & Power Co, and Wisconsin Power & Light Co.

Judges were Merryle S. Rukeyser, New York economic analyst and financial writer; Tom P. Walker, Irving Trust Co, New York; H. Weston Smith, vice-president, *Financial World*; and Fischer S. Black, editor, ELECTRICAL WORLD.

REA, All at Sea

On one loan the Rural Electrification Administration is literally all at sea. The $126,000 loan is to go to the Swan's Island Electric Cooperative, which will erect a generating plant consisting of two 90-kw automatic diesel units and 27 miles of line. The island, six miles off McKinley, Me., is inhabited mainly by fishermen, who will do all the unskilled labor needed to establish the system.

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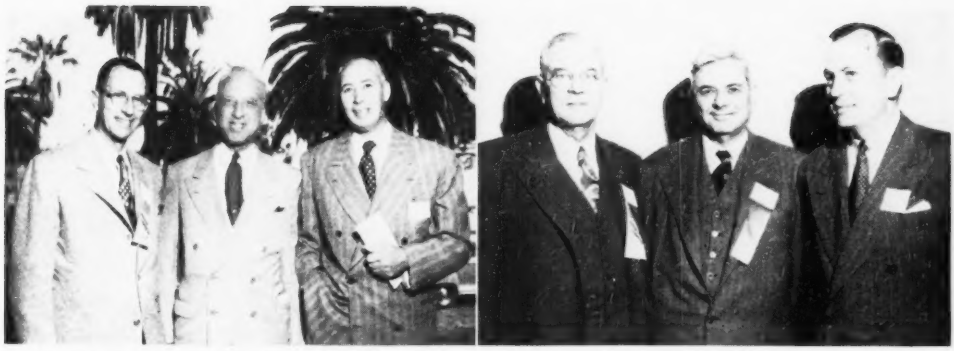
Iowa Franchise Voted

Evansdale, Iowa, voters have approved a 25-year electric franchise for the Iowa Public Service Co.



AT CORONADO convention of Pacific Coast Electrical Association I. W. Borda, new PCEA president, (left) poses with R. E. Mittelstaedt, president, California Public Utilities Commission, and M. G. Sues, retiring PECA president. D. D. Smalley, PG&E, left in righthand panel, presided over opening session where L. M. Klauber, San Diego Gas & Electric, and Fischer S. Black, editor, ELECTRICAL WORLD, spoke

New PCEA President Urges Sound Expansion with Eye to Economics

EXPANSION of resources and improvement of service at a pace consistent with sound economic growth is the primary responsibility of the electric utilities. So said R. E. Mittelstaedt, president of the California Public Utilities Commission, speaking May 25 before the three-day Pacific Coast Electrical Association convention in Coronado, Calif. Economic problems of the industry, he added, are even more complex than the formidable physical job ahead.

Steadily rising costs at a period of peak plant expansion and the effect of new electrical appliances, devices, and applications are two of the many problems involved. Because financial penalties of overexpansion are as severe on the industry and its customers as underexpansion, it must be as carefully avoided, he said. One pronounced trend is a more critical analysis of utility operating costs, not only overall but also by classes of service and by various area subdivisions. Mittelstaedt warned that subsidy burdens or increment cost advantages to special classes of service should be avoided as far as possible or fully recognized if adopted.

Capital additions of two billion dollars annually to carry a potential 50% increase in use of electricity by 1955 were predicted by Fischer S. Black, editor of ELECTRICAL WORLD, in the opening address of the convention. He reviewed development of all major phases of the industry as background for other general predictions of what the industry may expect in the future.

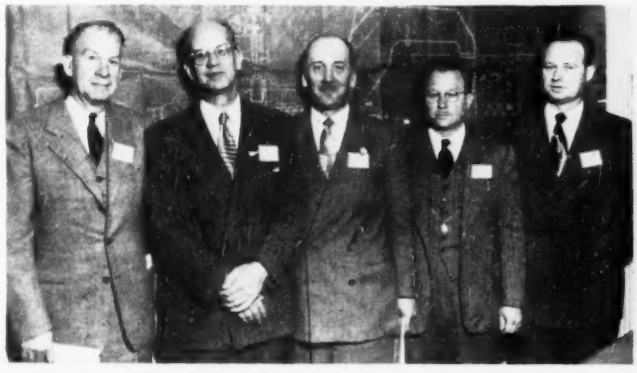
Increasing concern over present trends in government and their effect on industry was expressed by several speakers before the general meetings. Dr. R. E. Untereiner, California Institute of Technology, outlined the extent to which our tri-partite form of government has been broken down and the resulting effect on the private enterprise system.

The importance of telling the public what profits are and where they go as one means of combating the stigma attached to successful business enterprises was stressed by R. W. Turnbull, General Electric Co. He recommended as another means an employee relations program to include selling the employee on the importance of his job and more personal contact between management and worker.

S. M. Johns, Westinghouse Electric Corp, discussed the basic economics of a free enterprise system and pointed out that more efficient production is the best and only real way to increase the workers' purchasing power. R. G. Kenyon, Southern California Edison Co, recommended that employee relation programs be carefully analyzed to determine net return for money spent.

The need for efficient administrative services is becoming more vital to management during this period when business is tightening up, declared Harold Quinton, Southern California Edison Co. Now particularly, management wants accurate information on factors such as credit trends, as well as close budget control.

The less a man knows about his job and his employer the less he likes either of them is the basic reasoning behind the employee relations program



REHEAT construction and economics were investigated by this steam generation panel—T. M. Hotchkiss, Southern California Edison; H. G. Thielscher, Combustion Engineering; Alf Hansen, General Electric Co; R. H. Tilghman, B&W; and D. R. Jenkins, Westinghouse

of Hawaiian Electric Co. Ltd. as presented by C. J. Schiffers. Most important factors are improving supervisory relationships and getting ideas across to employees. Pictorial methods are used almost entirely.

Reheat Is Weighed

Station heat rates 4-5% lower for reheat than non-reheat installations at the same temperature and pressure levels are receiving careful consideration in view of present day fuel costs. A five-man panel of the steam generation group concluded that the additional cost of reheat (approximately 5%) may be justified, particularly on a unit system (one boiler for one turbine). On small systems added reliability of having three boilers for two turbines may outweigh the higher efficiency of reheat.

Greater reliability, improved signal to noise ratio, and ease of transmitting a large number of channels were among the advantages claimed for pulse time modulated microwave communication systems by R. G. Maddox, Federal Telephone and Radio Corp. Before a joint session of the communications and substation committees he described performance last winter of an installation in Nova Scotia as an example of the system's ability to maintain communication and telemetering during severe weather.

Favor Sectionalizing Switches

W. H. Peterson, Pacific Gas and Electric Co; J. E. Sinnott, San Diego Gas and Electric Co; and C. R. Canady, Southern California Edison Co, presented to the substation group field experience with re-energizing interrupted load after loss of diversity. One recommendation was for more sectionalizing switches to drop parts of the circuit before re-energizing.

Remarkable effectiveness of helicopter reconnaissance for major transmission line location was described before the transmission and distribution group by J. Lummis, Southern California Edison Co. Angle points are located and are marked by dropping bags of lime or flags for ground surveyors; tangents are examined; existing roads and roads to be constructed are located—all from the air. Three tentative routes for five miles of line were examined and the best one determined and shown to the right-of-way buyer and construction superintendent in less than four hours' flying time.

I. W. Borda, vice-president and Pacific Coast manager of Okonite, was elected 1949-50 president, succeeding M. G. Sues, Sues, Young and Brown.

AMARILLO, Tex., looked like this after a tornado struck the southern section of the city on May 15. The damaged utility facilities are those of Southwestern Public Service Co, which estimated its loss as $50,000. Every pole in the area was either broken, twisted, leaning, or loosened. Many poles were stripped of cross arms, transformers, or lines. Some lines had to be restrung three to four blocks north of the disaster scene. Four line crews were brought in from other divisions and in less than 24 hours service was restored. In both pictures note that the aerial cable (indicated by arrows) appears unbroken

Utility Asks BPA Help to Ease 'Power Shortage'

Proclaiming a "power shortage" that is becoming "progressively worse," Puget Sound Power & Light Co made a move recently to further interconnect its system with that of the Bonneville Power Administration.

The company applied to the Federal Power Commission for authority to maintain connections with BPA's Olympia and Snohomish substations in Washington without becoming subject to FPC regulation. Puget Sound also requested permission to make such further interconnections as might "alleviate the power shortage" in the Pacific Northwest. FPC approval is anticipated.

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To Build Mississippi Plant

Mississippi Power & Light Co has been given the green light to go ahead with construction of an $8,000,000 steam-electric generating plant at Natchez, Miss. The Mayor and Board of Aldermen have approved a 10-year extension of the company's franchise. Ground-breaking will take place within a month and initial installation will be a 60,000 kw. unit. The plant will be completed by January, 1951.

ALFRED IDDLES, left, president of Babcock & Wilcox Co; Charles E. Ide, vice-president of Toledo Edison Co; and Gwilym A. Price, president of Westinghouse Electric Corp, inspect the control panels of new 100,000-kw turbo-generator which has been installed at the Acme Station of Toledo Edison Co at Toledo. Unit almost doubles plant capacity

New Farm Program to Complement Pick-Sloan Plan Is Blow to MVA

BACKERS of the proposed Missouri Valley Authority took a body blow from a surprise quarter last week (May 26). The punch was Agriculture Secretary Brannan's announcement of a $3-billion, 30-year farm program to complement the Pick-Sloan plan of river development of the Army Engineers and Bureau of Reclamation.

The Brannan program was announced in Washington and at Rapid City, S. D., where the Missouri Basin Interagency Committee was meeting. The Interagency Committee, composed of five Federal agencies—including Agriculture—and representatives of Missouri Basin state governors, was set up to coordinate federal planning in the Basin and has fostered the Pick-Sloan program.

MVA proponents, abetted by a Hoover Commission task force report condemning alleged waste and inefficiency in the Pick-Sloan Plan, have been attacking the Engineers-Reclamation program. They have centered much of their fire on the lack of planning for upland soil and forest conservation above the major Pick-Sloan reservoirs and irrigation works. The new Brannan proposal would cover such development work.

The Agriculture Secretary has been under much pressure, including demands from Congressmen, to present a supplementary program to be carried in conjunction with the Pick-Sloan operations. Brannan, known to be friendly to the violently pro-MVA Farmers' Union, was even accused of delaying the agricultural program for the basin.

MVA adherents claimed some satisfaction from the estimated cost of the Brannan proposals, however. They pointed out that atop the more than $5-billion estimates as the cost of Army-Reclamation development, the Agriculture program would run the outlay for the Pick-Sloan projects to well over $8-billion, most of it in direct appropriations not to be returned to the Treasury. MVA, its supporters contend, would do the job partly with its own revenues and repay more of the federal investment.

Secretary Brannan proposed nine major programs to be conducted by his department. They would provide soil and grazing land conservation, forest protection, small-stream flood control, irrigation, drainage, soil and land surveys, extension education, and farm credit loans.

He also asked $138,000 for a two-year survey of farm power needs in the area by Rural Electrification Administration. A preliminary REA estimate fixed requirements for new distribution facilities of rural power systems of the region at $410,409,000, in addition to REA loan funds already available for use in the basin. These funds would build 346,123 miles of new distribution lines to reach 486,884 farms and 146,351 other rural establishments now without central station service.

Rural power systems would need additional funds for transmission and generation facilities, the report indicated. Steam and internal combustion generating plants would supply rural systems until major hydro projects of the Pick-Sloan program went on the line, then be used to firm up this hydro production.

REA figured it could provide funds for the rural power program from annual loan funds advanced by Congress.

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Commercial Cooking Offers Large Market

"If all food served in the country's 525,000 mass feeding outlets and baked in its 17,000 bakeries were prepared electrically, the resultant connected load would be 8,950,000 kw; annual sales would be 8,950 billion kwhr; and annual revenue would be $179 million." This was Harry Restofski's theme at the Commercial Electric Cooking Conference May 25 at Atlantic City.

Restofski is chairman of the Commercial Division General Committee of Edison Electric Institute, which sponsored the conference. Held in conjunction with the National Restaurant Show, the conference attracted more than 100 persons.

To reach the commercial cooking market successfully, Restofski asserted, the industry needs "more facts—too few companies have adequate information as to our market. We need stronger sales organizations; more study of equipment distribution, servicing, and wiring problems; better sales planning and sales aids."

The speaker, who is general sales manager for the West Penn Power Co, said, "At present commercial electric cooking is accounting for 28% of our commercial load additions and produces over $110,000 per year of added revenue. By the end of 1955 we expect to have captured 50% of the potential market, and to have a profitable, stable annual revenue from this one commercial market of almost $1.5 million.

"We licked the servicing problem by going into the servicing of commercial electric cooking equipment with both feet. We carry working supplies of parts, our servicemen have been well trained, and we have contracted with the two leading manufacturers to carry out their warranty service obligations," Restofski stated.

Utilities Must Sell $350 Million of Common in '49

Some $350 million in common stock should be sold by electric utilities in 1949, and it probably will be sold if the present favorable market continues. This was the prediction of John Childs, assistant vice-president, Irving Trust Co, at the spring meeting of the New Jersey Utilities Association, May 20-21, at Absecon.

Childs argued strongly against debt financing, even though it is cheaper, because maintenance of a balanced financial structure justifies the additional cost of equity financing. In reference to rate-increase applications, he said that regulatory commissions should allow a "cushion" over and above sharp pencil determinations of rate of return so that stock offerings would be attractive to investors.

A resolution taking note of ELECTRICAL WORLD's 75th anniversary and offering "heartiest congratulations and best wishes" was passed by the directors.

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Committee OK's Buchanan in Permanent FPC Job

The nomination of Thomas C. Buchanan of Pennsylvania as a member of the Federal Power Commission was approved by the Senate Interstate and Foreign Commerce Committee last week. Endorsement by the Committee is tantamount to confirmation.

Buchanan has been serving as a commissioner since July 14, 1948, when he was given an interim appointment by President Truman. Last year the Committee tabled his appointment "without prejudice," and he was continued on an interim basis. His term expires in June, 1952.

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Meter Fee Held Illegal

The $1-a-month service charge for utility meters recently levied by Tombstone, Ariz., has been ruled illegal. Justice of the Peace John Sebring said the fee was a tax, not a service charge, because nothing in the wording of the Council resolution establishing it showed intention to use revenues for utility improvements. It was indicated the City might appeal the ruling.

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Doon Franchise Renewed

Voters of Doon, Ia., have approved a 25-year renewal of the Iowa Public Service Co's electric franchise.

SEC RULINGS

Utah Power & Light Co has been authorized to sell its $3,000,000 of 30-year first mortgage bonds, subject to the results of competitive bidding. Proceeds would be used for general corporate purposes, including capital expenditures. (Release No. 9012).

Kentucky Utilities Co and its subsidiaries has been exempted from all provisions of the Holding Company Act. In January, the Middle West Corp distributed to its common stockholders its holdings of 1,655,000 shares (all) of the common stock ($10 par) of Kentucky Utilities. Kentucky Utilities is both an operating public utility and a holding company. It owns all of the outstanding securities of three small public utility subsidiaries, Old Dominion Power Co, Dixie Power & Light Co, and South Fulton Light & Power Co. The commission found that Kentucky Utilities "is predominantly a public utility company whose operations as such do not extend beyond the state in which it is organized and states contiguous thereto." The company contemplates the sale of its gas properties, located at Shelbyville and Paducah. (Release No. 9017).

Interstate Power Co, Dubuque, Iowa, has received authorization to borrow for construction purposes not to exceed $1,900,000 from the Chase National Bank of the City of New York and Manufacturers Trust Co. The notes would bear interest at 3% and mature on or before June 30, 1950, and would be collateralized by an equal amount of first mortgage bonds, 4¼% series due 1978. At the request of the company, the commission reserved jurisdiction over an additional $500,000 of borrowing contemplated by the middle of December, 1949. (Release No. 9018).

United Corp has been authorized to borrow $4,000,000 for the purpose of covering cash payments under its plan for retirement of its $3 cumulative preferred stock and to replenish working capital. The funds are to be borrowed in equal amounts from Bankers Trust Co, Chemical Bank & Trust Co, The First National Bank of the City of New York, and the National City Bank of New York, for which United will issue its one-year 2½% notes. The company's plan, which involves the distribution to preference stockholders of certain of United's portfolio securities, together with about $6,900,000 in cash, was approved by SEC on Feb 15, 1949, and by the U. S. District Court in Wilmington on Feb 15, 1949. (Release No. 9026).

Wisconsin Public Service Corp has received permission to borrow $1,500,000 from banks for use as temporary financing of its construction program. The borrowings, which will be represented by 2½% notes maturing Nov 1, 1949, will be obtained from the Chase National Bank of the City of New York, Harris Trust & Savings Bank, Chicago, Irving Trust Co, New York, Marshall & Ilsley Bank, Milwaukee, Marine National Exchange Bank, Milwaukee; and the Security National Bank, Sheboygan. (Release No. 9030).

Toledo Edison Co has been authorized to issue and sell $2,500,000 of 30-year first mortgage bonds, subject to the results of competitive bidding. Proceeds would be applied to the company's construction program. At the request of the company, the period for inviting competitive bids was reduced from 10 to 6 days. (Release No. 9031).

Cincinnati Gas & Electric Co has been permitted to issue and sell an additional 249,334 shares of its common stock to its stockholders. Stockholders will be entitled to purchase one new share for each nine shares held, the subscription price being $22 per share (par value $8.50). Proceeds of the sale will be used to finance, in part, the company's construction program. The company reserves the right to stabilize the price of the stock for the purpose of facilitating the distribution and offering. (Release No. 9058).

Iowa Power & Light Co has been permitted to acquire all of the outstanding securities of Western Iowa Power Co and through a concurrent liquidation of Western to acquire all of its assets. Iowa is to pay $3,430,000 cash (subject to closing adjustments) for the securities of Western. The securities, now held by Omaha Electric Committee, Inc, a nonaffiliate, consist of $1,800,000 of 3¼% and $1,550,000 of 4½% first mortgage bonds, due 1971 and 1976, respectively, and 5,000 shares of $10 par value capital stock. Properties of Western are to be operated by Iowa as a part of its southwest division, with which the Western properties are interconnected. (Release No. 9059).

Eastern Minnesota Power Corp has received approval on the final steps in its plan for liquidation and dissolution. (Release No. 9077).

MEETINGS

Canadian International Trade Fair
Exhibition Grounds, Toronto, Ont., May 30-June 10.

Pennsylvania Electric Association
Rural and Advertising Committees, Joint Meeting, State College, Pa., June 8-9; Electrical Equipment Committee, Spring Meeting, Roosevelt Hotel, Pittsburgh, Pa., June 13-14; Relay subcommittee, Spring Meeting, Fort Bedford Inn, Bedford, Pa., June 16-17.

Conference on Protective Relaying
Under Auspices of Georgia Tech Engineering Extension Division, Georgia Institute of Technology, Atlanta, Ga., June 16-17.

Public Utilities Advertising Association
Annual Meeting, Netherland Plaza Hotel, Cincinnati, Ohio, June 20-21.

American Institute of Electrical Engineers
Summer General Meeting, New Ocean House, Swampscott, Mass., June 20-24; Pacific General Meeting, Fairmont Hotel, San Francisco, Calif., August 23-26.

American Society for Engineering Education
Annual Convention, Rensselaer Polytechnic Institute, Troy, N. Y., June 20-24.

Edison Electric Institute
Hydraulic Power Committee, Shirley Savoy Hotel, Denver, Colo., June 22-25.

Northwest Electric Light & Power Association
Accounting & Business Practice Section, Vancouver Hotel, Vancouver, B. C., June 23-24.

American Society for Testing Materials
Annual Meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, June 27-July 1.

Canadian Electrical Association
Annual Meeting, Banff Springs Hotel, Banff, Alberta, Canada, June 28-30.

January Energy Sales Advanced 7.7% Over '48

Sales of electric energy to ultimate customers in January, 1949, totaled 21,830,832,000 kwhr, the Edison Electric Institute reports. This was a 7.7% increase over the 20,267,417,000 kwhr sold in January, 1948.

Revenues from ultimate customers amounted to $398,486,500 in January, compared with $362,407,000 in January, 1948, an increase of 10%.

For the 12 months ended Jan 31, 1949, the average use per customer advanced to 1.575 kwhr from 1,451 kwhr for the preceding year, an increase of 8.5%; the average annual bill to $47.25 from $44.69, an increase of 5.7%; revenue per kwhr dropped to 3.00¢ from 3.08¢, a decrease of 2.6%.

Classification of Sales, January

Kilowatthour Sales, January	Million Kwhr 1949	1948	Percent Change
Residential or domestic	5,424	4,777	+13.6
Rural (Distinct rural rates)	459	384	+19.5
Commercial or industrial			
Small light and power	3,834	3,570	+ 7.4
Large light and power	10,647	9,990	+ 6.6
Street & highway lighting	266	248	+ 7.5
Other public authorities	560	548	+ 2.3
Railways and railroads			
Street & interurban	359	437	-18.0
Electrified steam railroads	236	248	- 4.6
Interdepartmental	46	66	-30.8
Total to ultimate customers	21,831	20,267	+ 7.7

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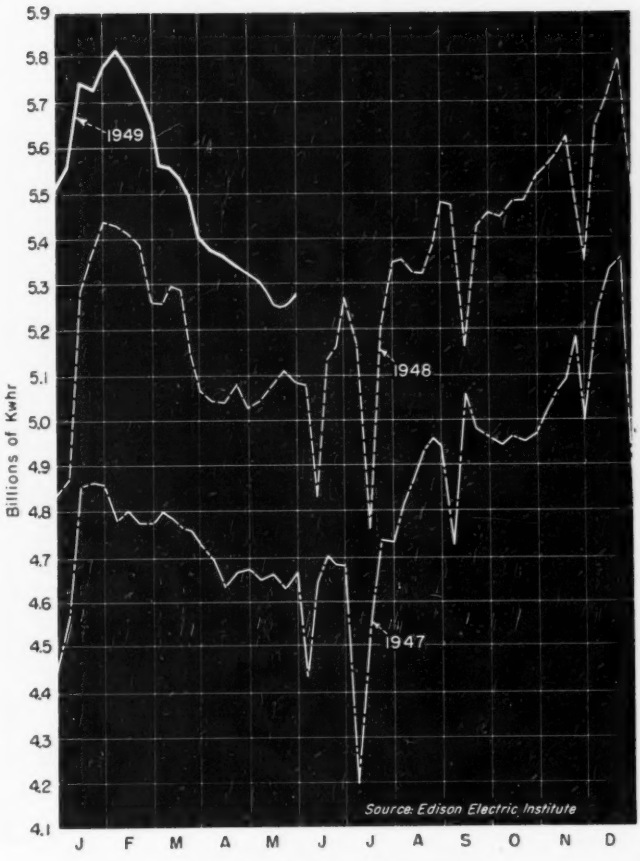
Texas Authority to Build 2 Dams on Colorado

Lower Colorado River Authority, in Texas, plans to build two more hydroelectric dams near Marble Falls under a state law permitting it to issue $25 million more in bonds. No Federal Power Commission license will be required for the project, FPC has ruled.

The complete project will cost about $20 million. The new dams, Marble Falls, just below the town of that name, and Granite Shoals, 11 miles above Marble Falls, will impound 200,000 acre ft of water and generate 75,000 kw. Granite Shoals will have two 22,500-kw units and Marble Falls two 15,000-kw units.

The Authority also will operate the Austin Dam, constructed in 1893 by the city and rebuilt several times, most recently by the Authority. LCRA's present system of four dams and generating equipment is valued at $58 million and has a capacity of 150,000 kw. At Buchanan Dam an additional 12,500-kw unit is being installed.



Output Moves Upward

The electric output curve moved upward slightly during the week ended May 28, 1949, according to figures released by the Edison Electric Institute.

The amount of electrical energy distributed by the light and power companies of the country amounted to 5,270,161,000 kwhr, comparing with a total of 5,255,272,000 kwhr for the preceding week.

During the corresponding week last year the total amount of energy generated totaled 5,076,025,000 kwhr, this year's figure representing an increase of 3.8%. This figure compares with a percent increase of only 3.3 during the week ended May 21.

Both the New England and the Mid-Atlantic states remained in the minus column, but the former group cut the percent loss from 3.5 for the week ended May 21 to 2.9 for the week ended May 28. The Pacific Coast States showed a remarkable recovery, from a 6.7% increase to an 11.0% rise for the week ended May 28. The largest individual increase was shown by the South Central group.

Weekly Output, Millions Kwhr

1949	1948	1947
May 28 5,270	May 29 5,076	May 31 4,429
May 21 5,255	May 22 5,085	May 24 4,663
May 14 5,257	May 15 5,109	May 17 4,616
May 7 5,284	May 8 5,087	May 10 4,653
Apr 30 5,304	May 1 5,042	May 3 4,640
Apr 23 5,376	Apr 24 5,027	Apr 26 4,668
Apr 16 5,343	Apr 17 5,087	Apr 19 4,660
Apr 9 5,360	Apr 10 5,033	Apr 12 4,620
Apr 2 5,378	Apr 3 5,037	Apr 5 4,693
Mar 26 5,404	Mar 27 5,065	Mar 29 4,729
Mar 19 5,496	Mar 20 5,145	Mar 22 4,759
Mar 12 5,531	Mar 13 5,285	Mar 15 4,764

Percent Change from Previous Year

	May 28	May 21	May 14
New England	- 2.9	- 3.5	- 2.7
Mid-Atlantic	- 1.4	- 1.6	- 3.1
Central Industrial	- 1.5	- 2.5	- 0.4
West Central	+ 6.8	+ 8.5	- 8.4
Southeast	+ 3.6	+ 4.4	- 4.9
South Central	+12.4	+ 9.5	- 9.9
Rocky Mountain	+11.9	+ 9.5	- 8.9
Pacific Coast	+11.0	+ 6.7	-10.5
Total United States	+ 3.8	+ 3.3	+ 2.9

WASHINGTON COMMENT

WILLIAM B. WHICHARD

WELL IN ADVANCE of the Senate hearings on the Administration's Columbia Valley Administration proposal, it was generally known that the present session of Congress would create no new valley authorities. Matters of higher priority on the Truman legislative program simply will crowd out both the CVA and Missouri Valley Authority bills between now and the summer adjournment. There is bitter opposition to authority legislation in both the House and Senate, of course, but the end-of-session concentration on essential bills, which already has developed in Congress, is the real barrier.

Not that the Administration has slackened its push behind the CVA measure. The President never misses an opportunity to give it a boost, as he did recently in the ceremony staged when a new generator went on the line at Grand Coulee Dam. And top Interior Department officials, notably Assistant Secretary Davidson, plug for CVA almost every time they have an audience.

But the valley authority adherents are receiving unforeseen assistance of possibly decisive future import from the current trend of employment.

The Administration, at last, has dropped its drive for inflation controls. Instead, it has gone to the other extreme. The government's April tally of unemployed—3,016,000—has brought up talk about federal "pump priming" and "make-work" projects.

The pump priming will show up in the revision of the so-called Spence Bill, which died in its original anti-inflation version. The new proposal to put government money into industrial plants will be advanced as a means of making, or preserving, jobs.

It was first conceived to help eliminate shortages of vital materials and equipment. The former price and allocation controls will be dropped entirely in the new legislation.

Congress already is concerned over the rise of unemployment. The legislation recently passed by the House to provide plans for some $500 million of new public buildings reflected this anxiety. The desire for a backlog of public works construction projects also figured in the committee hearings on flood control authorizations.

Administration economists are telling newsmen that federal pump priming will be a "must" if unemployment rises to 4,500,000. That is where the make-work features of the new Spence Bill will fit in, they say. The U. S. can step in to take over, or build new plants where major industrial operations close down.

The valley authority backers already have jumped on to the lick-depression bandwagon. They can plan and build conservation developments faster and better than anyone else, they claim. They point with pride to the Tennessee Valley Authority as a "depression baby."

With an administration that is favorably inclined toward valley authority plans, the Congress, either in special session or at the start of next year's session, may well be stampeded into approving CVA, MVA, and any or all of the half dozen or more other regional authority development plans that have been seriously presented to it. It may be, that is, if unemployment is still on the rise and if the residents of the proposed authority regions are not inclined to put up a real protest.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Transformer fire protection is mostly automatic under temperature control; flashover because of water spray has been practically negligible.

Daylight is measurable accurately, noon to sunset, by a newly developed photronic unit with compensated diffusing pickup.

Substation equipment of the obsolescent indoor type can occasionally be protected against fire at much less expense than replacement with outdoor devices.

Banking of secondaries is slowly but steadily gaining acceptance. At least 161 utilities have more or less extensive installations.

Tie-line load control could conceivably be linked automatically with the boiler and turbine controls for more complete mastery of fluctuations and disturbances.

Superheat control approaches the realm of servomechanisms because of the several minutes of inherent lag in response.

Electrical instrument sizes are small and uniform; mechanical control board meters are all sizes and shapes—a fine opportunity to correct an incongruous situation.

Electrostatic precipitators can well have dampers to divert the ash-laden gases away from the sections being rapped.

Barriers can, of course, be omitted between station transformers but it entails thorough safeguarding of the spare unit and complete confidence in the fire protection installation.

Propulsion to the tune of 228,000 horsepower is expected to be required for the 103-mile 30,000,000-ton-per-year conveyor belt planned for the Ohio River to Great Lakes area.

The President Reports—

E. R. ACKER, President, Edison Electric Institute

WE CAN NOW SAY with confidence that the reserve margins of the industry will continue to build up more rapidly than was originally contemplated and that no section of the country, except possibly the Pacific Northwest, will be handicapped by a lack of capacity during the coming winter. In most areas normal reserve margins will be restored by the end of this year rather than at the end of 1951 as originally scheduled. This situation is the result of two principal factors operating in favor of increased reserves. These are, first, a speeding up of the delivery and installation of new generating units, and second, a marked decrease in the rate of growth of electric loads throughout the country, particularly since the first of the year. Under these circumstances the back of the "power shortage" threat has been broken and the industry can go forward with renewed faith in its ability to meet any conditions which can be foreseen at this time.

Time to Start Selling

The picture today is so materially improved that many electric utilities see an immediate need for the resumption of intensive sales effort. This need, of course, is directly related to the increased revenues required to provide earnings which will attract the new capital involved in the industry's $9 billion expansion program. We have now passed the halfway point in this program, the financing of which raised grave doubts initially in the minds of many people. The record to date, however, has been most gratifying and the favorable market reaction to recent utility common stock offerings is particularly encouraging. The more difficult half of the industry's financing program still lies ahead in that it involves a higher proportion of common stock financing than has been accomplished to date. Under the circumstances the net income showing and dividend record of the utilities will play an increasingly important part in their future financing problems.

ERNEST R. ACKER

Graduating from Cornell in 1917, Mr Acker went right into the Army. Discharged in 1919, he joined Central Hudson as cadet engineer in the operating department. He became general superintendent of Kingston Gas & Electric Co in 1921 and commercial manager of Central Hudson in 1925, president in 1932. He is a past-president of the Empire State Gas & Electric Association and of the American Gas Association which honored him with the Chas A Monroe Award for outstanding contribution to the advancement of the gas industry

An important element in offsetting increased investment cost is the attachment of new business. Notwithstanding the effect of rate increase, the industry will ultimately need an increased volume of business to support its large new investment. In this regard our sales organizations have a greater opportunity than ever before to do a constructive job and by selective selling to make an important contribution to the over-all success of our operations. This effort will involve, in my opinion, a closer coordination with the work of our rate organizations than has previously been achieved. This is of particular importance during the present period of rate adjustment inasmuch as we now have the opportunity to revise our rate structures in the light of new appliance development and new uses of our service—an important example being the field of electric house heating.

Fight for Survival

We know that the complete nationalization of the power industry is a fundamental precept of socialistic planners. It is important to note that this issue has gradually been broadened and brought more fully into the open, so that today it represents not merely the fight of our industry for survival but the fight of all industry and of the American people for the preservation of their democratic principles of government.

I strongly endorse the recommendations of past-president Charles E. Oakes with reference to the national power policy, made in his address at the 1948 convention of the Institute.

I urge that the electric industry continue and redouble its efforts to bring to the general public a clear understanding of the principles at stake and in particular, a full knowledge of the unsound economics involved in the public power program. It seems clear to me that as a part of its public duty the industry must courageously set forth the principles which will guide its operations, must state its position with respect to public power and must press for the development of a national policy consistent with the ideals of our democracy.

Section 11 and a Strong Utility Industry

EDMOND M. HANRAHAN, Chairman, Securities and Exchange Commission

NO AMERICAN INDUSTRY, to my knowledge has undergone so thorough an overhauling as that experienced by the electric utilities during the last 10 years. This has come about none too soon, for the industry has been and is now confronted with the necessity of financing a construction program of tremendous proportions. While the rate of future growth will depend, of course, on the ebb and flow of the business cycle, it is nevertheless an unchallenged fact that electric utilities must plan their financing in the light of long term prospects of substantial growth. Fundamentally the mark of a soundly organized industry is its ability to raise funds, which is in turn the ability to command the confidence of investors. I think it is quite clear that the industry of 10 years ago could not have carried off this great financial operation.

Equity Extensions Resisted

A holding company with an integrated system can perform a genuine service in coordinating the physical properties of the system and in enlarging the area of operational planning. It can also—and most certainly should—perform an equally essential function in assuring its system a strong capital structure. In a few systems this objective has been opposed by certain stockholder groups, primarily interested in capital gains, who wish to see holding company securities retain a speculative flavor. In order to minimize their own personal income taxes, they prefer to see earnings stay in the business rather than to be paid out as dividends. They are bitterly opposed to increasing or even maintaining the equity base through sales of additional stock. Most of them wish to see senior securities heaped upon the financial structure to increase the leverage inherent in their common stock position. Needless to say, the SEC will fight this tendency wherever and whenever it appears. The purposes of the Holding Company Act would indeed be poorly served if integrated holding company systems were painstakingly created, after long and difficult effort by managements and the commission, only to be turned again into top-heavy vehicles of speculation. This must not be.

EDMOND M. HANRAHAN

Member of the New York Bar, Mr Hanrahan received his LLB from Fordham University in 1928. He practiced law in New York until he was appointed a member of the Securities and Exchange Commission in 1946. He became chairman in 1948

Selected excerpts from most of the addresses before the EEI Annual Meeting are presented in this section. Unfortunately, four talks were not received in time for publication.

Generally speaking, the electric utilities are to be commended for the soundness of financial structure which they have maintained. There are only a few companies in the entire industry which have shown significant deterioration in capitalization ratios. Yet I, for one, would feel more comfortable if common equity were actually being increased during periods such as the present when investors are looking very favorably upon utility common stocks. The construction program is not scheduled for completion tomorrow or the day after. Most companies will go to the public for funds once, twice, or several times before even presently scheduled construction is completed. There is certainly no assurance that markets for common stock will continue to be as favorable as has been the case in the recent past. Many companies simply cannot afford to gamble on the future in this respect.

Sound Position, Bright Prospects

Isolated instances may be noted in which the principles of sound financing have been grossly violated. For example, some companies have attempted to resort to the lease-back device. In view of the debt structures of most utility companies, the imposition of long term leases in any substantial amount is inappropriate if not positively dangerous. It is most encouraging, however, that the great majority of utility companies have taken the longer view and have refused to entertain such policies. The industry has achieved an enviable reputation for its sound position and its bright prospects. The corporate jungles of days gone by are rapidly disappearing. Strong individual operating companies and compact new holding company systems have emerged as a result of the Section 11 program.

You Can Lose Only Once

JAMES H. McGRAW, JR., President, McGraw-Hill Publishing Co

WE ARE NOT going to awaken the public to the threat that confronts us unless we ourselves are thoroughly awakened to it. We must be aroused to the point that we do something about the greatest internal problem of our industry—that is, the recruiting of manpower to fill more of the seats of management with younger, more vigorous men. Probably the greatest tragedy in the whole situation arises from our past failure to recruit, train and promote manpower adequately: to provide ample incentives and the opportunity for real advancement on a merit basis; and to allow intelligence and ability to move freely between companies.

If we are sufficiently aroused, the industry will develop the unity now so tragically lacking. I am told that the membership in this Institute, largest and most influential group in the industry, is something under 200 operating companies. Yet the Federal Power Commission lists 314 Class A and B operating companies.

The Need for Unity

I do not know of another major industry so lacking in unity; and no industry in America needs unity so much. The American Association of Railroads includes 90% of the Class One roads. The American Petroleum Institute includes better than 90% of the top companies.

The time has come when utility men must recognize that no issues within the industry can be permitted to obscure the common grave issue. In the face of common danger, it is time to call a truce on all internal differences, resentments, jealousies and antagonisms, whether they be personal, regional, technical or economic.

The time has come when the power industry must face up to the realities of its present and prospective situation, and must decide on a course of action. As I see it, there are three possible choices: First, it might accept the present situation as being beyond remedy and elect to live with federal power as a neighbor and competitor while resisting further encroachment. In my judgment, such a position is untenable. . . .

JAMES H. McGRAW, JR.

A job on Electrical World 34 years ago was Mr McGraw's introduction into the publishing business founded by his father. Under his leadership as president and chairman of the board, the company has grown greatly in scope and influence, both in this country and abroad. Under his active direction are 34 domestic and foreign magazines, the McGraw-Hill Book Company, and the McGraw-Hill International Corporation, a network of business and industrial correspondents that covers the globe

Second, the industry might move to buy and absorb existing federal power facilities. However desirable such a course might be, from a technical and economic viewpoint, I do not believe that it would be politically feasible at this time.

This leaves a third possible course. It rests on the accepted principle that electric power must be responsive to the will of the people it serves. If it is in the public interest to control private power through local regulation, then it is equally in the public interest to take control of federal power out of the hands of the bureaucrats in Washington and place it in the hands of the people it serves.

Boldness Essential

It will be very difficult to appraise and master the complex problems of engineering, finance, administration, and of commercial, governmental and public relations that are involved in such an undertaking. Yet I know that there are in this industry enough men with the boldness and the resourcefulness necessary to work out a program that would be economically sound, feasible, and so clearly in the public interest as to find acceptance with the people. The power industry must call upon those men to organize *now* and devise a practical program to that end.

It seems to me that we would get help from powerful sources for any such plan. Certainly the regulatory commissions should lend aid. The municipal utilities, power cooperatives and other non-federal power groups have as much to lose as we do, if the trend toward nationalization continues.

The Real Issue

The economic growth of large areas is jeopardized right now by the absence of a clearly defined federal power policy. Until there is such a policy, the question remains as to how far the government should go in power supply. The real issue is not how far, but whether the federal government ever should be in the power business at all.

Controlling Costs–An Opportunity

PHILIP SPORN, President, American Gas & Electric Co

MEETING of the postwar increased demand for electric service in this country has elicited without question the admiration of that part of the world which has the slightest comprehension of power and its significance in the modern social economic scheme of things. But have we established that fact clearly and firmly in the minds of all the people whose opinions of the character of the job we are doing are important to our welfare? Do all our municipal and state officials know it? Do our representatives in both Chambers of the Congress fully grasp it? Does the general public know it?

I have been asked time and again by members of regulatory commissions, by a good many of our large consumers, by professors of engineering at some of our leading schools, and by professional economists, for an explanation of how we have been able to control costs as well as we have. The reason these people asked the question is because they truly didn't know, and they were interested. They didn't and don't know because we haven't told them. And that I think is bad.

Much More With Little More

The investment account of the private utility industry stood at $14,075,000,000 average for 1939 and on a comparable basis at $16,850,000,000 in 1948; this is an increase of $2,775,000,000. Had there been an increase in utility plant corresponding to the increase in demand during the decade, the increase in investment should have been $10,100,000,000; the actual increase was, however, just about ¼ of that. What is the answer to the mystery?

The basic reason for the record on costs established by the industry is a three-part one: A sharp reduction in the amount of plant per kilowatt and kilowatt-hour sold; less manpower per kilowatt and kilowatt-hour; and the integrated effect of numerous techniques and devices designed to reduce capital and operating expense.

PHILIP SPORN

Best explanation for Philip Sporn's eminence in engineering would be to say that if he had a middle initial it would be W, standing for "work". He is a 1917 EE graduate of Columbia which in 1948 gave him the University Medal. He was awarded the AIEE Edison Medal in 1945 and received the honorary degree of Doctor of Engineering from Stevens Institute of Technology in 1947. He joined the American Gas & Electric Co in 1920 and progressed through numerous engineering and executive positions to become president in 1947. He is a frequent contributor to engineering society and other technical publications

What we have done in reducing costs is no mystery but is all explainable. We are neither miracle men nor have we done it with mirrors. All of the avenues of approach to cost reduction need to be followed through, and all of them that hold any promise at the end need to be thoroughly explored and re-explored if the rise in costs of electric service is first to be arrested, and if later the trend is to be put back on a downward course.

Leads the World

The power industry is undoubtedly doing an outstanding job in furnishing the people of the United States with a power supply system unmatched anywhere else in the world. Technically, it is ahead of what has been developed anywhere else. Nobody questions this. And if anyone did, the members of the scores of foreign technical delegations and commissions that have come to our shores in the last four years would quickly give an irrefutable answer. Viewed in proper perspective, the supply of power in the United States has always been adequate. On cost of electric service what we have done is an achievement in social economics of first magnitude. It is true that over the past few years there have been some rate increases but these have been relatively negligible.

It is important that we use the experience of the past as a guide and as an inspiration to develop other and new ideas, and to exploit the old ones to their maximum, so as to be able to continue to meet the basic test of giving the service required at minimum cost. It is imperative that we continue to strive to improve, that we pioneer, experiment and develop the new. And having tried something new, we must retain and expand that in it which is good and reject the bad. And while doing this, we must continue our search for something better—for the almost unattainable. Only thus can we meet our responsibilities.

We Must Sell to Live

J. H. JEWELL, Vice-President, Westinghouse Electric Corp

CAPACITY is catching up with load. By 1951, the electric utilities will probably have a capacity margin of 17%. Two years ago annual increase in energy sales was 14.6%; last year it was 10.5%; this year it is running around 6.3%. Now is the time to head off this sagging trend.

You will have a period during which operation with greater reserve capacity may be more profitable. You can shut down your inefficient generating sations. Should any load drop off, it will probably be some of your lowest price load and you may be tempted to hold off on aggressive selling because things look temporarily better from a financial standpoint.

But, any temporary benefits which will come with these lower load factors can be very deceptive and cause dangerous delays in starting aggressive selling programs.

In Position to Sell

We recently made a survey covering 62 companies who serve about 60% of the customers on the lines of the business-managed electric utilities. A general conclusion from the survey is that about 75% of the industry feels able now to push increased use of power aggressively.

Our survey was carried further. We asked the same utilities if they would tell us the amount of money in their sales and promotion budgets this year, for last year and for 1939. Also, how many men in the company were devoting their time exclusively to sales and promotion in those three years?

While answers were not secured from all 62 of the utilities, a sufficient number gave us figures to serve as a definite guide to the general situation.

It was surprising to us that on a connected meter basis, a smaller amount is being spent today for selling than in 1939. Even when you allow for the fact that a few of the companies reduced their budgets due to going out of the appliance business, these figures are still very startling.

JAMES H. JEWELL

Completing the Westinghouse graduate student course in 1922, Mr Jewell was first assigned to the small motor section at East Pittsburgh. In 1930 he was made manager of the construction industry section after several years as a salesman in that line. Later he became district manager of agency sales in Philadelphia, then moved back to Pittsburgh as assistant manager of the department, becoming manager in 1940. He was appointed to his present position in apparatus sales in 1947

Consider the large increase in sales costs since 1939—higher salary levels, higher training expense, more costly advertising, etc. Also in 1939, we were coming out of a depression and most budgets were still held rather tightly; we were definitely not in a period of easy money.

A few companies need fewer employees in the commercial department because they have discontinued the sale of appliances. But the many new uses of electric power in all of your markets should require more commercial employees in an average utility company. Before the survey was made, we felt sure that we would find almost as many employees per connected meter; instead, the number has been reduced by one-third. This survey indicates that the utility industry has a big job ahead in building its sales organizations and getting selling started.

Unfortunately, aggressive selling operations cannot be turned on and off at will. Sales training programs are necessary, customer education plans must be developed, and many new techniques of mass selling must be introduced into your power sales field.

The Challenge to Sell

Do we in the electrical industry have something real to sell and are there real rewards for selling now? First, and very important, we have new, better and cheaper ways of bringing about a still higher standard of living. Also, we have an industry that challenges the very best that is in us and will continue to challenge the future generation with plenty of room to grow.

But, even more important, I sincerely believe that one of the fundamentals of a free economy is the right and the will to sell. There are no goods or services to sell in a communistic economy. Our free economy has the best, and in fact its only, chance to survive if we continue to sell a higher standard of living on a sound basis.

If we return to being a strong aggressive selling industry we will grow, and be free and live, but we *must sell* to live.

Standardization—An Investment

A. C. MONTEITH, Vice President, Westinghouse Electric Corp.

STANDARDIZATION has been criticized by some, because the results have not been clearly evident. To see the benefits achieved requires a comparison with some industry such as the automotive business, where standardization has long been thoroughly practiced and therefore the major gains from it have been realized. Here we find the comparative results startling. Comparing 1948 with 1939 figures, automotive wages have risen 82%, materials 90%, and car prices 89%. In the electrical manufacturing industry, where standardization is just being felt, wages are up 90%, materials 76%, but prices are up only 38% as compared to 89% increase in car prices. One concludes that electrical manufacturers have had a certain amount of standardization accompanied by volume to act as a brake on rising prices.

Two Kinds of Standards

There are many varieties of standardization. One class embodies those standards which each manufacturer sets for himself.

The other class, industry standards, comprises those which users and manufacturers in a given field develop cooperatively. Circuit breakers, distribution transformers, and steam generation units are in this category. These, if followed, are the most effective brand of standards, as both user and manufacturer have crystalized a common point of view.

The unit substation is an outstanding example of how the manufacturer can help reduce your system investment by combining all the elements for distribution substations into a few standardized coordinated units. Increasing construction labor costs have greatly stimulated the use of unit substations.

An outstanding example of a general industry standard more fully developed is that of steam turbine generator units, which was approached with skepticism in many quarters. Here the steam pressure, temperatures, bleed points, and kilowatt ratings of all turbine generator units from 11,500 to 60,000 kw have been standardized on. Already acceptance has been excellent. Over half of all machines falling within these boundaries on order are standard.

A. C. MONTEITH

Widely known among electrical engineers, Mr Monteith's career covers 25 years, all with Westinghouse. He began at the East Pittsburgh works, where he was assigned from the student course to the central station engineering department in 1924. He was made manager of that department in 1938, and three years later became head of the industry engineering department. After serving as headquarters engineering manager since 1945, he was elected vice-president in charge of engineering and research in 1948

Your customers who push buttons and like to live electrically do not care how you get electricity to their homes as long as you do it economically.

Standards to last for a reasonable length of time and be accepted must be based on sound engineering and not be purely arbitrary or commercial.

The great crying need today is not to rush forward into an accelerated program of creating new standards, but to accept in fact, not just in theory, the standards already on the books.

Don't Beat Standards Down

It is difficult for an engineer to resist the urge to bargain for something not quite standard, in order to achieve some local need, fancied or real. It is even more difficult for the manufacturer, in periods of low business activity, to resist that request because not only does he need the business but also he does not wish to jeopardize the overall and perhaps sizeable order.

The customer engineer, by winning from the manufacturer an agreement to something beyond the standard may indeed take pride in this horse trading, feeling he has achieved some gain for his company by so doing. Nothing is farther from the truth. The inescapable result is an increase in costs. They may be hidden costs, impossible to totalize, but they are none the less real. They inevitably must be taken into account and play a part in establishing cost levels all out of proportion to their transitory worth. In this respect, manufacturers are at your mercy. You, from the president down, who are anxious to keep investment costs down, must not only encourage the establishment of standards but also you must insist that your people abide by them. You, gentlemen, the final users, pay for every successful attempt to sabotage either a manufacturer or an industry standard.

Outlook for Utility Financing

HAROLD H. YOUNG, Partner, Eastman, Dillon & Co

SALES OF MORTGAGE BONDS represent the least of your worries. There is no let-up in sight in the demand for good public utility mortgage bonds.

The Life Insurance Association of America, in their 1948 report for companies representing nearly 90% of the total assets of the life insurance companies in the country, indicated that the admitted assets of these companies showed a net increase last year of more than $3,200,000,000. As long as you have such a volume of money seeking an outlet, along with other institutional demands, there would seem to be little worry about the ability to dispose of bonds.

The volume of preferred stock financing has been relatively low in recent months although it has been showing signs of revival. When I was a kid in the business in the 1920's the going rate for preferred stocks was about 7%. In more recent years this rate declined and, after a while, the average return on preferred stocks was so low as to discourage further interest on the part of most private investors.

Preferred Stock Prospect

Present indications are that preferred stock financing can be done in greater volume than that prevailing for some time if the companies are willing to accept the fact that the return to the investor may have to be from around 4¼% to 4½% for the better recognized names and 4¾%, or even higher, for the less favored names.

Questions are raised occasionally about the use of convertible securities, either debentures or preferred stock. Convertible securities used in the proper place can be very helpful, but if used ill-advisedly, they can be a serious handicap. When new equity financing has to be done the presence of the convertible securities in the financial structure is a deterrent because conservative analysts often look at earning power, giving effect to potential dilution through the conversion, even if conversion has not taken place.

HAROLD H. YOUNG

As writer and speaker on financing, Harold Young is well known for his ability to present such subjects, deeply technical as they are to most people, in interesting and illuminating fashion. He is at present giving a lecture course on "Current Developments in Utilities" at the New York Institute of Finance and is a regular contributor to "The Investment Dealers' Digest". He also writes for other publications and is in demand as speaker to investment dealer and utility groups

Turning now to the common stock market, the picture is a more cheerful one than we have had in some time. The more favorable feeling toward utility stocks, which began to be in evidence around the turn of the year, was brought about in considerable measure by the change from an atmosphere of inflation to one of deflation. The price structure of utility commons has already strengthened. I am inclined to give encouragement to any of you who need equity capital in the near future to take advantage of the good demand which now exists.

An objection raised in some quarters to the purchase of utility stocks is the failure of the industry in recent years to show gains in the balance of earnings for its common stockholders commensurate with the growth in business. In fact, composite figures for the industry have been very disappointing in the small increases on the bottom line, especially in view of new capital invested.

Sorry Return on Equity

I picked a list of eleven representative, well-known utility companies whose common shares were in the hands of the public as far back as 1940. If an investor had owned one share of each of these stocks in that year his combined dividends would have been $25.53½. The return on the equivalent holdings in 1948 was $24.04½. In other words, he would not have fared as well last year in monetary return as he fared in 1940, and if we even mention the purchasing power represented by that return, the story is a sorry one.

There are two schools of thought about raising common equity. One group favors keeping dividends low and retaining earnings to as high a degree as possible so as to minimize new financing while the second group favors the payment of a fair dividend and the raising of new funds from sale of additional stock, as needed. My vote is cast unhesitatingly for the second approach.

Some companies seem strangely reluctant to raise their dividend rates in the face of earnings which would seem to warrant higher disbursement, and in my opinion, this is a shortsighted policy.

Rate Trends and Problems

S. W. ANDREWS, Rate Engineer, American Gas & Electric Service Corp

IN 1947, rate increases were granted to 13 electric utility companies. This marked the end of the long period of electric utility rate reductions which started in the middle 1920's. In 1948, there were 77 rate increase applications which were granted. In the first four months of 1949, there were 31 rate increase applications granted. This makes a total of 121 rate applications granted since the beginning of 1947. There are 22 cases which are still pending. There was one case in 1948 which was denied. There was one instance in 1948 and another in 1949 where companies withdrew their applications before their cases were heard.

The total number of these applications amounts to 146. There were 115 companies involved. The total money involved in these increases during this period amounts to about $78,000,000 granted and about $22,000,000 where the cases are still pending, a total of approximately $100,000,000. This is a large sum. Yet it is modest, because it compares with about $30,000,000 of reductions made in the single year 1946.

When the time came that rate increases were needed, they were secured almost 100%. Our records show only one denial and that the majority of increases granted were for the full amount requested. And the increases, for the most part, were granted promptly.

Weight of Increased Costs

The industry is engaged in an expansion program for the purpose of rendering the type and kind of electric service which the public expects and demands. Since the war not only have costs of operation gone up—all the material which we buy, as well as labor rates which we pay—but the tremendous increases in demand for service have required the provision of additional facilities and

S. W. ANDREWS

MIT graduate in electrical engineering, with a previous AB from Amherst. Mr Andrews started with the Scranton Electric Co as a construction man in 1925. The next year he moved to the power sales department and in 1928 transferred to the AG&E Service Corp commercial department as assistant power engineer, later becoming rate engineer

are continuing to do so. These are fundamental facts of our industry and I think there is no question but that they have been recognized by all the commissions and given full weight by them in their considerations of our problems.

Another fundamental fact is that when the industry is in the midst of an expansion it is never able to finance entirely from its own resources. The industry must go to the investing public and sell securities of one form or another to finance the necessary construction program. I believe that all the commissions recognize the problems of financing and that they give full weight to this factor in their deliberations on rate matters.

There is considerable evidence that many of the materials used in the operations of the companies have reached their peak prices and have perhaps started to decline. There are new generating units coming on the line which will have higher efficiencies than older units. Utility managements are constantly studying and developing ways of achieving more economical methods of operation.

If sales programs can be carried out which will bring about a better balance in sales as between the different classes of customers and which will bring about better load factors on our facilities, provided always that the individual rate schedules are appropriate, such sales programs will work in the direction of lower rates.

On the other hand, the addition of new facilities at present and probable future high prices quite definitely works in the direction of higher rates because of higher fixed charges—depreciation, local taxes, necessary return.

Not Just Wait and See

Whether the forces working towards lower rates will outweigh the forces working towards higher rates, or whether the reverse will hold true, or whether the two will balance each other, only time will tell. I do not mean we should just sit by and wait to see what happens. Operating economy must be developed to the utmost and sales programs be made as resultful as possible.

During the past year or two, many of the rate proceedings have been accompanied by thoroughgoing public relations and customer relations activities. Many companies have found it wise not only to make a convincing case before the commission which has jurisdiction but, what is of equal importance, also to make a convincing case before the public which they serve.

Thermal Prime Movers

CHARLES W. E. CLARKE, Vice President and Consulting Engineer, United Engineers & Constructors, Inc

FOR UNITS in the sizes generally required by the utility industry, the steam cycle will be the primary cycle for some time to come. An increased number of unit systems will be installed, ie, installations consisting of one boiler and one turbine.

A gas turbine can be built which would require no cooling water whatsoever; it could be remotely controlled and operated; and it does not require complicated foundations or building structures. With all these advantages many systems should not only find it possible but should welcome the use of gas turbines even in the moderate sizes. It is to be expected that the gas turbine will develop into reasonably large units as time goes on.

Reheat Trend

The case for or against the thermal advantages of reheat can be covered in a few words. Assuming the maximum desirable operating temperature to be 1,050 F, a unit operating on a reheat cycle and reheating back to 1,000 F or 1,050 F will produce economies comparable to those secured if the initial temperature were 1,200 F without reheat, a temperature not advisable at this time. Developments are now in progress which may permit use of considerably higher temperatures and again make it inadvisable to consider reheat installations.

In the neighborhood of 100,000-kw capacity, the increased cost of a reheat over a nonreheat installation is of small magnitude. With units half the size, say 50,000-kw capacity, the increased cost might amount to $10 to $12 per kw. In the previous wave of reheat installations a total of about 60 units were installed. There are now on order 60 turbine units which will operate on a reheat cycle, with a total capacity of about 3,500,000 kw.

CHARLES W. E. CLARKE

Specialist in steam engineering practice for 40 years, Mr Clarke has played a large part in the development of the modern steam station. He started as a draughtsman in a boiler concern and worked his way up to his present eminence in the profession. His career includes association with such well-known firms as Sargent and Lundy, Dwight P. Robinson, Stirling Co, Stone and Webster and others

Maximum steam pressure considered available for use in steam-generating plants is in the neighborhood of 2,500 psi. At this pressure, with a multistage, regenerative, feedwater-heating system, a temperature of 1,050 F, and reheated to 1,000 F, the net obtainable thermal efficiency would be between 36% and 38%. Condenser loss amounts to about 50% to 55% of the total fuel burned in the boiler system and some 10% is discharged at the stack.

At the time of the mercury cycle's development it looked particularly attractive, as the available heat rates were considerably better than was possible with materials then available for steam-plant cycles. But in later years developments in metals resulted in a steam-cycle improvement also, and the mercury cycle today, except in special cases, would not seem to be especially attractive.

There are on order or in use, for utilities' service, 7 gas turbines: 3 3,500-kw units, 3 5,000-kw units, and one 1,875-hp unit.

In small units, gas turbine thermal efficiencies can be obtained which far exceed those obtainable from any commercial installation of like size which would be made on a steam cycle. While the gas turbine has specific limitations as to attainable efficiencies, its type of construction is such as to permit safe operation at much higher temperatures than are now possible with the steam cycle.

Fuel-Reserves

We have three million million (3,000,000,000,000) tons of coal underground. This figure represents approximately 99% of the original deposits; in other words, only 1% of the original reserve had been consumed as of the above date. There still remains a large national reserve, ample for our requirements for centuries.

The quality of coal from any of the important producing fields should steadily improve, since marginal wartime coal production is gradually being displaced in the market by production from modern, well designed, coal-preparation plants. The degree of this displacement and, hence, improvement in coal quality will depend, to a great extent, on general business conditions.

Coal-production costs can hardly be expected to be reduced materially when we consider the extent of new investment required by the coal industry and the effect of wages paid to employees which, in the coal industry, amount to over 50% of the total production cost at the mine.

Distribution for Tomorrow's Loads

T. J. BROSNAN, Distribution Engineer, Buffalo Niagara Electric Corp

SINCE THE CLOSE of the war the attention of our industry has been focused on the construction of additional generating capacity.

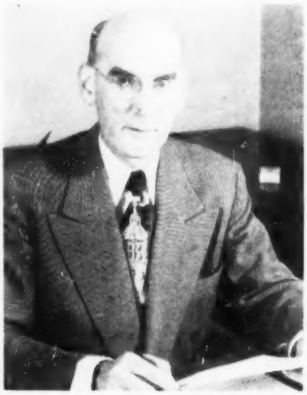
The load growth that has occasioned the present rapid expansion in generating capacity seems to be predominantly in the residential and commercial classifications. Such load increases require expansion of all of the items in the load area distribution system. It is, therefore, most probable that for every dollar invested in new generation there should be about $1.50 invested in the expansion of load area distribution.

Attention Given to System Design

When a company decides to install a new generating unit involving an estimated expenditure of let us say $12,000,000, the management of that company takes an active interest in each step of the design and construction of the unit.

How many of us give the same attention to the design of the load area distribution systems that will be installed to deliver the output of the new generating unit to the ultimate customer? Do we appreciate that something in the order of $18,000,000 will be spent in the load areas in order to distribute the output of this $12,000,000 generating unit?

Obviously management cannot review each of the many small distribution projects to make sure that the proposed investment will become part of a dependable, flexible and economical distribution system. However, they can make sure that the men who design these minor extensions are provided with a sound basic plan for system expansion and that they understand how the small individual projects are expected to fit into that general plan. They can also make sure that these men are provided with adequate guides for the proper design of those projects.



T. J. BROSNAN

Distribution engineering and Tom Brosnan have been associated with each other for many years. Each views the other with respect. After graduation from Catholic University of America he spent five years with Westinghouse as student and general engineer before joining Buffalo Niagara & Eastern Power Corp in 1930 as assistant electrical engineer. Two years later he became distribution engineer. Beside his chairmanship of the EEI Transmission and Distribution Committee, he is a member of the Cable Engineering Section of AEIC, the Insulated Conductor Committee and the Transmission and Distribution Committee of AIEE.

In my opinion there should be a basic plan for the development of the distribution system in each load area supplied by a company. The basic plan should recognize the probable trend of load growth and establish the fundamental development of the system to provide for this growth. The pattern should be flexible to accommodate unexpected changes in the trends and should provide for system expansion in rather small increments so as to avoid excessive investment far in advance of load requirements. It should guard at all stages of development the maintenance of proper balance between investment and operating charges. It should establish for each load area the quality of service for which the system should be designed.

Reduce Energy Losses

Two decades ago energy losses of 20% within a load area were not uncommon. Losses in modern load area distribution systems are at least 25% lower than this. However, losses are still an item of major importance. Still, I wonder how many know how close their present distribution design comes to economic balance.

When we think of methods of reducing distribution losses without excessive increase in investment, our first inclination is to consider the basic plan for system expansion. It is obvious that much can be accomplished by bringing the subtransmission circuits close to the load by the use of small automatic substations carefully located throughout the load area. Other companies have achieved the desired results by the use of higher distribution voltages. Such major design factors are of prime importance. However, we should stress with equal diligence the need for economic balance in the design of the small projects through which the distribution system capacity is increased.

The excessive losses of each poorly designed secondary require extra capacity in a distribution transformer, a distribution feeder, a substation, a subtransmission circuit as well as in the "bulk power" system. Not only must the generating plant provide the energy lost in that secondary but also the added losses incurred in the delivery of those losses through the system.

Residential Rates for Tomorrow's Loads

L. R. LEFFERSON, Manager, Rate Dept, Ebasco Services, Inc

PRESENT RATES are designed to fit anticipated residential loads falling within a fairly narrow pattern of loads and load factors. When a significant number of residential customers begin to require capacities substantially beyond the pattern*, it is time to take stock of the situation. There is today a strong indication that that time has arrived and that even now we may be at the crossroads in basic residential rate design. Within the past year a subcommittee of the Rate Research Committee has been appointed to appraise residential rates in general and, in particular, to study the possible need for some form of demand charge applicable to loads of unusual capacity.

Residential Demands Growing

This question of a demand provision of some kind in residential rates is even more important in serving the farm home than the urban home. Oftentimes, service on the farm starts out with residential characteristics but gradually grows into a commercial enterprise. When this change is discovered our rate application clauses tell us this customer should be reclassified as commercial. The result is usually a substantial increase to bill. How much better it would be if the residential rate anticipated such a change by the inclusion of a charge for demands of unusual size. Under such circumstances the bill would increase gradually along with growth in the enterprise, and this is something the customer can understand.

Some people may criticize the suggestion of a demand element in residential rates on the grounds that it is a departure from the simple forms for which we have all been striving for so many years. Simplicity of rate form is an undeniably desirable objective but not to the extent of jeopardizing the financial integrity of the enterprise. Then, too, it should not be overlooked that adoption of the demand principle as presently applied still leaves the vast majority of customers on a simple block rate form. Certainly it is not an insurmountable task to sell the demand principle to the remaining few.

L. R. LEFFERSON

His more than 31 years of experience in the field of utility rates gives to Mr Lefferson's present words an authority that should be heeded. After graduation from Lafayette College as an electrical engineer, he spent several years with operating companies, then joined Electric Bond & Share as a rate consultant in 1918. He became assistant manager of the rate department in 1926, and manager in 1933. He has consulted on rate problems in practically every state in the nation and in 14 foreign countries. He has been a member of the EEI Rate Committee for many years

Many of the new residential devices and uses undoubtedly have a high diversity but this is probably not true at all. Unfortunately, these devices are so new and the installations are so scattered that dependable information is not yet available. For space heating it seems obvious that the diversity within the class is practically nil.

Serious Rate Problem Arises

Electric space heating, except in a few sections, is only in the beginning state and consequently has not as yet provoked widespread rate consideration. In the Pacific Northwest, it has grown with increasing popularity for several years. Existing rates in many cases were of the straight block type and exceptionallly low in general level. They did not contemplate the high demands and low load factors inherent with space heating. Consequently, a serious rate problem has developed and especially for those companies under state commission regulation.

What is a serious rate problem today for the Northwest could well be an acute problem for others tomorrow. Now is not too soon for all companies to be giving serious thought to what may be best for their individual situations and putting their conclusions into action. It is easy to put off until tomorrow what should be done today but, in our business, it is often very difficult to do that job when tomorrow comes though it could have been easy to do today.

While I have stressed space heating as one of the new uses requiring possible redesign of residence rates to meet future conditions, it is by no means the only new use requiring attention. I have used space heating merely as an example. We need to know more than we do about the load characteristics of all new household devices, both on individual and composite bases.

* In parts of the paper not reproduced here, specific references are made to new uses of electricity in domestic service, particularly to radiant heating.

Make Friends in Financial Agencies

TOM P. WALKER, Vice-President, Irving Trust Co

DURING the past two decades, a series of circumstances, largely with Washington origin, have caused serious disturbances in the normal flow of capital from the producer to the user. Holding companies, the source of most of the capital required during the 1920's, when the industry had its first great period of expansion, are largely eliminated. The channel through which the investor furnished the funds has been broken. Now many operating companies, scattered throughout the land, compete with each other and with all other industry for the investor's favor.

While at the moment there is no problem placing senior securities, too much complacency could develop a false sense of security. Insurance company leaders point out the gradual increase in the debt ratio of some companies, and the small increase in net income as compared to that of many industrial companies. Should such sentiments grow, the bloom could easily fade from the present good feeling the industry enjoys.

New Pool of Capital

While not a newly come source of equity capital, investment trusts during recent years have become increasingly important as investors. By paying attractive commissions, they have made it worthwhile for security dealers to seek out those with small savings but little experience in the direct purchase of securities. One of the big three in this field recently announced a plan to sell shares on the installment plan. Thus a tremendous pool of new savings is being substituted for that which tax and other governmental policies dried up in recent years. These trusts, both closed and open ended, are a fertile field for cultivation as a source of equity capital.

Let's take a look now at the role of the investment banker in the investor relations picture. He must know markets, that is, the current tastes of the various types of investors. You know the value of his advice on your financial problems, how he can negotiate a private deal for you, and finally his primary function as a merchant buying your securities for re-sale to his customers.

TOM P. WALKER

The old cliche, "needs no introduction", probably applies more accurately to Tom Walker than to any other man on the convention program. An electrical engineer graduate from the University of Nevada, he joined the Stone & Webster organization in 1916 and in 30 years with S&W saw a lot of the country in increasingly important power company positions in Nevada, Massachusetts, Louisiana, Virginia and Texas. During the war he was president of the Council of Electric Operating Companies

I may not close this parade of agencies, which buy securities directly, without a word concerning the place of commercial banks and trust companies in your investor relations program. From the small-town depositary in the far reaches of your service area to your big city bank, your banker provides many opportunities to make easier the path between you and your security holder. Your relations with commercial banks in large financial centers can also be personal and intimate. Here you will find a good place to start building an acquaintanceship in the larger financial communities.

Security Analysts Important

Now for the group of agencies which act principally as advisors to the investor. The speediest and most effective system of communication in the financial community operates among security analysts. Get to know a few of the leading utility security analysts well. In return for a better understanding of your operation, they will keep you advised on the reactions of the financial community to your policies and program. A visit to your territory from one or more of your analyst friends always gets good response. Whether in small or large gatherings, the point is to get over to these analysts at every opportunity, and frequently, all the information and ideas you can muster. They will see that the news spreads quickly and the more friendly and better informed the group is, the better will be the flavor of your securities to the taste of the investor.

Standard equipment of those who pass judgment on your operations are the financial manuals. Moody's, Standard and Poor's, and Fitch's publications are everywhere in the financial communities. The goldfish bowl environment, in which the electric industry operates, assures much more complete and accurate statistics than for other less regimented industries. However, there still remain nuances in interpretation of the bare figures that personal contacts with these agencies can bring out.

The Lawyer in Rate Proceedings Today

PAUL W. McQUILLEN, Partner, Sullivan & Cromwell

IT IS YOU and not the lawyers who best can carry the ball in rate proceedings today. The lawyer must still be on the team, but not in the leading position he had in most of the important rate proceedings during the 20-odd years before 1946. This may sound to some of you like a change in legal point of view, but it is in fact only a recognition of the change in the nature of these cases that has taken place.

Superficially it may seem that the three principal issues in any rate case are the same as they used to be and that the only big difference is the identity of the party asking for a quick decision. The first new task of the lawyer has been to look beneath the surface of the legal forms and behind the forms of old legal habits to find the real nature in these times of the interests he is called upon to advocate and of the interests of others with which he must deal. In so doing he has found a greater community of interests than might have been imagined and has tried to avoid the old type of rate proceeding as far as possible.

PAUL W. McQUILLEN

Paul W. McQuillen, member of the firm of Sullivan & Cromwell, N.Y.C., is a graduate of Georgetown College and Columbia Law School. Long engaged in the legal affairs of various electric utilities, he has also specialized in the field of corporate finance as counsel in matters including a wide range of utility work for investment bankers and other clients.

Vital Public Interest

When the late war burst upon us, we woke with a start to the realization that, above the old concept of the interest of consumers, there was a national public interest vitally dependent upon the supply of electric power. That brought us back to the fundamental common denominator of the interests of all persons concerned in any rate case—the public service itself—the now crying need to make sure that everyone will have or continue to have all the electricity he needs.

Having found the original principle of rate regulation again brought to life by the surge of business after the war it became the lawyer's task to suggest procedures that would help the authorities controlling rates to recognize and apply it. Now that you are gaining in the race to keep ahead of customer demands, it is our task to see that the basic purpose of regulation, to enable a utility to give all the service demanded, is not forgotten or obscured in a maze of methods contrived in the past by people struggling against each other instead of struggling together to solve a common problem.

At this point the lawyer passes the ball to you. The best way to help rate authorities realize that your problem is their problem too, is not to have a lawyer start a case or even to send a lawyer to speak for you, it is for you, the top management, to take the top officials into your confidence by personal talks which let them know the substance of your plans and the reasons for them. Try to pave the way for your organization to submit and discuss informally with the commission's staff supporting data already prepared and any other information that may be requested. This procedure affords a chance of real expedition.

Can Help in Preparation

While you are engaged in the preparation for and the conduct of preliminary discussions of the sort suggested, your lawyer should, of course, be working with your staffs and with you in helping to select and express the ideas and organize the material in ways which will be legally sound and which may be followed consistently through any proceedings that result. In spite of your best efforts to obtain a change in rates without any need for further legal services, you may be unsuccessful and may have to go through a formal proceeding. In that event, the preliminary discussions should have smoothed the way somewhat and may have resulted in outlining and simplifying the case to be presented and may also have contributed to a more sympathetic consideration of the arguments you advance.

(After the foregoing exposition of the lawyer's role in present-day rate proceedings, Mr McQuillen discussed the factors entering into them—effects of increased costs of operation and of new plant; advisability of upward revision of revenue forecast bases; earnings requirements for attraction of new capital; need for facing realities in determination of rate bases and rate of return as against dependence on theory alone; validity of the financial market's appraisal of utility securities as the test of correctness of rates.)

Protecting the Taxpayer

C. EMORY GLANDER, Tax Commissioner, State of Ohio

TOO MANY PEOPLE have the delusive impression that governments can indulge in an everlasting orgy of spending at the expense of persons other than those directly benefited. Our nation is suffering from a chronic attack of the "gimmes," and it is high time that we face the facts!

Taxes in the United States now consume about 30% of our total national income. This means that our people work about 15 weeks out of 52 for government. Federal taxes alone last year were about two billion dollars more than the total national income just 15 years ago. The truth of the matter is that the percentage of all taxes to national income has more than doubled in the last 20 years. This trend, sooner or later, will take its tragic toll of our American standard of living.

Taxes Reduce Enterprise Money

If the government continues to take each year in taxes more and more of our dwindling earnings, there will be less and less available for investment to maintain and expand our economy. The hope for a free America is an ever-expanding economy based upon private enterprise. But this nation cannot nourish an expanding economy if our well-spring of national savings is pumped dry by government.

Here is the danger which confronts our nation—that, oblivious to the consequences, we shall spend, tax and borrow ourselves into financial slavery. I say to you that the time has come to cut governmental budgets, to pay governmental debts and thereby to pave the way for ultimate tax reduction—that is, if we really do love our children or have any concern for the generations yet unborn. After all, it is our debt, not theirs. It is ours to liquidate if we have the moral stamina for self-sacrifice which it sternly requires.

C. EMORY GLANDER

President of the National Association of Tax Commissioners, C. Emory Glander taught at Purdue and Ohio State after graduation from the latter university. He began law practice in 1930 and served as executive secretary to the governor of Ohio during the administration of Governor Bricker. He became tax commissioner in 1945

We need to pray, as Thomas Huxley did when he summed up the scientific creed in a single sentence, "God give me strength to face a fact though it slay me."

You may ask me what particular governmental expenditures should be cut. It is precisely because I do not know that I can suggest at least two desperately needed reforms in governmental finance. One is the need for budgeting and accounting procedures that will clearly show the people what spending programs are contemplated, what they will cost, and how wisely the money has been spent.

I think that business-like budgeting and accounting, from the federal government on down, would expose startling information. I believe it would reveal countless cesspools of waste and extravagance that always develop in governmental units that, having no controls, tax and spend and spend and tax.

You may have an academic interest in tax structures, but what you most want is substantial tax reduction. Suppose, however, that is not possible now or, being possible, is not accomplished. Can anything else be done for you? I think it can within the field of tax administration.

The one thing that you as taxpayers dislike more than paying taxes is a tax administration that favors some of you and prejudices others. It is in the area of administrative enforcement, however, that we are most tragically deficient in achieving consistency and impartiality of treatment among taxpayers.

Catch the Tax Dodger

There can be no justification whatever for a situation in which one taxpayer is required to pay his taxes while his tax-dodging competitor is permitted to escape his share of the burden. The great majority of people pay taxes honestly and on time. It is highly desirable that we protect their interests as well as those of government by universal enforcement.

Nevertheless, I think we have reached a point where increases in the services of government, no matter how desirable they may be, must be evaluated in terms of the burden upon the taxpayer. There was a time when this was a factor in determining how much governmental service should be bought with public funds. It must be a factor once more. There are powerful lobbies behind the tax spenders. There are very few spokesmen for the taxpayers. Somehow, in our wilderness of taxes, their voices must be heard.

Protect the taxpayer and you protect the revenue.

The Practicalities of Employee Morale

KINSEY M. ROBINSON, President, Washington Water Power Co

HOW CAN WE stimulate our industry's many thousands of employees to a higher level of morale which will result not only in an impressive effort to preserve private enterprise but in a crusade? How can we make employees conscious of the world-wide trend that threatens them? Is it possible to make employees sufficiently informed that they can speak of their jobs in terms of freedom?

We have been given the third degree by Federal bureaus; powerful combines have perfected a shocking underground organization with but one goal—government ownership—the death of private industry. National groups, with not the slightest interest in Northwest development, but with a keen anticipation of control, have exerted pressures seldom seen by a military task force. We ask ourselves out there in the Northwest, how does it happen that we have survived at all? Still, as I say, in spite of all this, our employees, plus acceptable company policies, have won the consumer to our side.

Corrective Action Taken

Out in the Northwest, when we learned that some employees were unhappy, we set out without delay to correct the difficulty. Our supervisors were called in to a series of training conferences, where we talked rather plainly, too. Supervisors were reminded that if industry functioned in the latest democratic fashion, if employees could vote on their immediate supervisors, many of the foreman group would undoubtedly be looking for new jobs. It was urgent that we all learn what was wrong. Then, without criticism or censure we attempted to make that wrong exist no more.

In an effort to bring management closer to the employees, we took a second step. This time each division, or local area was invited to elect one employee each month to come in to the general office and sit down with management. Linemen and plant operators who had never visited in the general office before, sat around the table with top management. They asked questions. They related anything that bothered them. Heroes, that's what they became. Back they returned to the home office. They were now in the confidence of management. They were on the inside.

Is employee effort worth the time and the cost? Well, all I can say is that our companies aren't worth much to us if we lose them. Henry Ford spent one and one-half millions to announce a new model car. The federal government spends 74 millions annually to tell its story. Transferred to a totalitarian state tomorrow, we would probably spend many miserable hours each month being indoctrinated—which seems difficult for some of us now. I am of the opinion that employee participation is worth the effort and the cost many fold. In a twelve-month period, our employees gave a total of over 1,600 talks, reaching more than 85,000 people; employees encouraged 1,200 outside organizations to use company windows for display purposes; another 100 organizations utilized our lobbies and floor space; over 20,000 deliberate acts of kindness were performed. Community building projects were numbered at nearly 4,000; some 10,000 newcomers were called upon personally; nearly 5,000 grievances were cleared up. And you would be surprised at the quantity of literature that was mailed. Employee support is waiting at our very elbows and it can be turned to immediate use almost for the asking.

KINSEY M. ROBINSON

President of Washington Water Power Co since 1938, Kinsey Robinson started his electric utility career in 1911 when he went to work for the Idaho-Oregon Lighting & Power Co as a grunt in a line gang. The I-O L&P Co was a predecessor of Idaho Power in which company Kinsey served successively as local manager, division engineer, division manager, vice-president and general manager, becoming president in 1934. Four years later he moved to Spokane and the presidency of WWPCo

Now Is the Time

The time to enlist employee support is now. It seems quite possible to me—almost a reality—that if our employees are presented with the facts, and if they have the right attitude, uninformed influence in our organizations will give away to excellent morale. What's more, it is just possible that if each employee somehow can be made responsible for the friendship of—say 30 families over the next few years—our public relations would be greatly strengthened. It would indeed be wonderful if our employees, under our leadership, could save the heritage that has made this meeting possible today.

The Industry's Part in Financing

HAROLD H. SCAFF, Vice President, Ebasco Services, Inc

As co-chairman of a joint EEI and AGA committee, created to study the "Financing of Utility Capital Requirements," Mr Scaff summarized the conclusions of the committee in his paper. Further summarized, the conclusions are presented here. The complete report of the committee will be printed soon.

A GREAT MANY UTILITIES feel that if they do a good job locally in explaining their situation to the investing public, they have done their share. Unfortunately this is not so.

The hard facts are that the public considers the utility business as an industry. Adverse situations affecting one company tend to harm others in the business. But the utility business does not as a rule, act, think, or talk as an industry. If it is to cope with the situation which now confronts it, it cannot continue on its present individualistic course. An information program on the national level is an urgent need.

Investors, Underwriters and Dealers

A large number of electric and gas utilities have been confronted recently with the new experience of maintaining relations with investors, underwriters, and dealers. Each company should analyze its own list of security owners to learn where it is already favorably known, and to gauge how broad a market is desirable or feasible to reach in order to raise the funds required. A program of banker and dealer contacts that will be broad enough to accomplish the desired results then can be outlined satisfactorily. Good investor relations do not just happen: they have to be achieved.

Regulatory bodies that are not already cooperating can help the earnings picture by bringing their ideas more closely in line with current conditions by abandoning rigid adherence to theoretical rate-base and rate of return theories and recognizing rate bases and rates of return to yield earnings that will attract capital now and in the future. They should re-examine their methods and principles to give more recognition to the fact that rates are fixed for the future and not for the past. This would mean giving more weight to anticipated plant investments, as well as required earnings.

The committee makes the following recommendations:

"That the Securities and Exchange Commission temporarily suspend the applicability of Rule U-50 to sales of electric and gas utility preferred and common stocks and adopt a new rule providing that such sales may be made by any method, providing that the Commission retains jurisdiction over the reasonableness of prices and spreads. The suspension should be made permanent if, after a trial period of two years, the new procedure is found satisfactory.

"That the Securities and Exchange Commission increase the exemption from competitive bidding on debt transactions to $3,000,000 in any one calendar year, from the present level of $1,000,000."

HAROLD H. SCAFF

After service in the first World War and accounting experience with several companies to supplement his education at New York University, Mr Scaff joined Electric Bond & Share in 1923. The next 12 years were spent mostly in the field working on accounting and financial problems of operating companies. He was appointed assistant general auditor of Ebasco in 1936, comptroller in 1940, and became vice-president in 1943

Characteristics of Securities

Mortgage bonds have established fairly definite patterns with respect to sinking funds, maintenance and replacement funds, dividend restrictions and certain other features. The number of debenture issues have been too few to establish any particular pattern. Convertible debentures have been used to some extent in financing programs. Depending on the conversion features, interest rates compare favorably with rates of first mortgage bonds. Frequently, common stocks of utilities have been offered to stockholders at a price below current market before they are offered to the public. This enables the stockholder to maintain his proportionate equity in the enterprise.

Tax relief for utilities would undoubtedly help to induce utility equity investment. For example, one of the obvious forms of special relief might be the repeal of the federal electrical energy tax, which is generally recognized as discriminatory against privately owned electric utilities and excessively expensive to administer. Tax relief for individuals also would help utility equity investment very greatly.

Long-Term-Lease Financing

WILLIAM W. BODINE, Financial Vice-President, The Penn Mutual Life Insurance Co

THE PURCHASE-LEASE plan is basically a simple transaction involving the purchase of existing real estate and improvements or the construction of new buildings, and the execution of a long-term lease to a corporate user (usually the original owner).

However, as developed, it differs from an ordinary lease so as to make it for all practical purposes a new and separate medium of financing or investment lying somewhere between pure ownership of real estate and ownership of full faith and credit obligations of the tenant company.

Credit can be used only once—if you use it for purchase-lease arrangements, it cuts down by just that amount the balance of the credit remaining for other purposes. If the same building were financed by the sale of securities with the ownership resting with the utility company, the cost of the building could be included in the rate base, whereas under purchase-lease it is questionable if any amount could be so included.

Effect on Common Stock

If you contemplate purchase-lease transactions to an important amount, consideration should be given to the effect on the sale of additional common stock. The leverage factor produced by debt at low interest rates creates a part of the earnings for the common stock, and the interest factor in purchase-lease transactions is lighter than the interest usually paid on first mortgage bonds and other evidences of indebtedness, including debentures and bank loans.

I can think of a hypothetical situation where such financing would seem to me to be desirable and entirely justifiable. Take an interconnected power pool to which a number of companies are parties and let us say that the load centers have been such that it has been advantageous

WILLIAM W. BODINE

Needs no introduction to power company men. Before he joined Penn Mutual he was one of the electric utility fraternity. After service in the first World War, following graduation from Harvard and University of Pennsylvania Law School, he entered the employ of the United Gas Improvement Co. In 1925 he was elected a vice-presidency in 1934 when U G I executive vice-president. He held that office until 1941 when he became president. He resigned the presidency in 1943 when U G I divested itself of certain interests in conformity with the Holding Company Law and changes were made in its organization

to the whole for one company not to develop generating capacity to any degree but to purchase its requirements from one of the other companies. Then comes the time when the load distribution dictates additional generating capacity in that company's charter territory. It may well be that the funds to be raised represent a substantial percentage of the company's outstanding securities, too great to be easily absorbed by the market at one time. What, then, is the company to do? Is it to sell some bonds, some preferred stock, and some common stock over a period while the generating station is under construction and thereby take a chance on future market conditions while being bound by the obligation of completing the new station, or should it seek assurance of its financing? A purchase-lease or modified plan might well accomplish that purpose, of necessity involving charges for a period of years (purchase-lease) or substantial initial debt to be rapidly amortized (modified plan). No capital structure can be inflexible over the years—always a certain percentage of debt and fixed charges, a certain percentage of preferred stock with its dividends, and a certain percentage of common and surplus.

Same as Buying Power

Please note also that in my hypothetical case the distributing utility company would be doing exactly the equivalent of what it did in the past in purchasing power, namely, paying a price which includes all operating expenses, taxes, depreciation and a return on any money it had invested in the plant. Of necessity the cost of purchased energy includes the cost of money and depreciation, which would certainly be at least as great as the interest and amortization factors in rental payments under a purchase-lease.

In closing, let me say that there can be no subterfuge for long in the market place, for it will find you out. Any plan of financing must be open and above-board, fundamentally sound and in the long-run interest of the issuing company, and therefore of its security holders. That is the more true today with the tremendous growth in the institutionalization of the people's savings.

We Must Sell Aggressively Today

EDWIN VENNARD, Vice President, Middle West Service Co

A properly designed sales promotion program should be based on improvement in percent return on total investment. To show the need for such a program, Mr. Vennard presented a series of charts. From them he reasoned that if present trends continue, rate of return in 1951 will not be above 5% and may be close to 4. Setting 6% as desired return, he concluded from the evidence of another group of charts that the feasible way to reach that rate was by reduction in operating ratio. He made the following suggestions for achieving that result.

THE SALES DEPARTMENT should prepare a complete sales program by years broken down by classes of service and by individual appliances. The program should be designed to improve load factor, net revenue and percent return.

Gross Up, Return Down

When percent return is declining with an increase in gross operating revenue, it means we are not receiving sufficient money for the increased sales. The fault may lie in the character of the new business or may lie in the rate schedule. To determine the fault and make necessary correction, we need to know more about the load characteristics of the various types of new business.

Under present-day conditions, we need to be more scientific in our rate design so that we can be assured that an adequate increase in percent return results from the sales effort. Thus we need more cost analyses to determine the earnings by rate schedules and especially to determine the percent return that we realize from the bottom steps in our rates. These analyses naturally have their limitations. But they are a necessary guide to good management and a primary requisite in a program designed to effect an increase in percent return.

EDWIN VENNARD

A leading exponent of the "rise-up-on-your-hind-legs-and-fight-back" school in respect of government in the power business, Ed Vennard started as an engineer. After graduation from Tulane University and a year in the GE test course, he entered power sales work with Gulf States Utilities, later moving to Southwestern Gas & Electric. He was commercial manager when he was brought into the Middle West home office

Where rates are faulty, steps should be taken to make necessary corrections. Special consideration should be given to:

(A) Bottom steps of all rates.

(B) Rates to residential customers having a high demand and low load factor. Most residential block rates are designed to cover residential customers within a fairly narrow range. For large residential users above, say 5 kw, residential rates should be equipped with a demand feature.

Consideration should be given to the specific design of off-peak power rates applicable to those industries that can profitably operate during off-peak hours. Such off-peak provisions should be rigidly enforced whether or not the company has excess reserve capacity.

During the 30's, plant capacity reserves reached a 40% high. Present rates cannot carry such excess. Much has been learned in the art of pooling, keeping reserves to a minimum. This pooling should be a specific part of the program of increasing percent return.

A sales accounting procedure should be established which will show the ratio of sales expense to the gross dollar increase produced by sales effort. This sales operating ratio is as important to the efficient operation of the sales department as is the over-all operating ratio of the company in determining the efficiency of the company's operations.

Investment for New Business

The work order procedure should be designed so that there is shown not only the new investment to serve the particular new business but also the allocated portion of the power pool (power plant and transmission) investment. Thus the work order will show total investment chargeable to the particular business. The net revenue from the business will then be related to the total investment so that the management can be assured there is satisfactory percent return on total investment. Also, the procedure makes all key employees conscious of the importance of the power pool investment.

Finally, the program of improving percent return should be properly presented to all key employees. All will play some part in its success. Progress reports should be issued from time to time with emphasis not on gross kilowatt-hour sales, nor gross revenue, nor even net revenue, but upon percent return.

What Are We Selling For?

D. C. McKEE, President, The Empire District Electric Co

IF I were to characterize generally the era ahead of us, I would call it the era of more complete utilization. Within the near future, through the cooperative efforts of rural electrification distributing cooperatives and our companies, all of the rural areas, as well as the centers they surround, will be served. Then our objective will be to develop and promote full utilization of our services, and to provide these services at the lowest possible cost consistent with sound business principles.

As we approach the threshold of another era and every company is giving consideration to a sales program, it is timely that we stop and ask ourselves, "What are we selling for—What is our purpose or objective in selling?" However varied might be the views of companies on sales efforts and programs, the answer to this question is vital to all of us.

A Social Objective

Our industry could not have grown and will not continue to grow if it had not in the past, and does not in the future fulfill its obligations and keep before it a broad objective—a social objective. What is this objective? It is to make sure that this great force of electricity does accomplish the greatest social and economic good to all our people.

Will our sales efforts increase the comfort or convenience of our customers? Will our sales efforts increase production or reduce costs for the users of our service? Will our sales efforts increase the employment and purchasing power of our people? Will our sales efforts contribute to the health and safety of the public? Will our sales efforts bring credit to our company and a recognition by its customers that we are more than fulfilling the obligations we assumed by acceptance of a grant of the exclusive privilege of service?

DONALD C. McKEE

Middlewesterner all the way is Don McKee. When he talks of Main Street he knows his subject. A 1919 electrical engineer of Iowa State, he was first a cadet in the Doherty Training School of the Denver Gas & Electric Co. Then in 1920 he was transferred to the engineering department of Empire District, and in 1922 became superintendent of the meter department. Successively manager of power sales, assistant general manager, vice-president and general manager, he was elected president of the company in 1948

In this country today, there has developed a great conflict in the thinking of our people, a conflict of philosophy, a conflict of principles as to the relation of government to industry. In this conflict, our industry has been singled out for attack. You may or may not agree with me that this attack is a calculated scheme to entice the public into some form of socialism or statism. There are many deliberate efforts to bring statism about, but I believe that the vast majority of those who advocate a change from our established American principles are unaware of the ultimate end of the path down which they are being led.

I have a firm faith that the people of this country will ultimately recognize that the voices calling for the destruction of our industry are those of false prophets. There is still a general belief in the fundamental principles of private enterprise, which made this country great, and by means of which it is the country in the world receiving the highest blessings of electric service. We are not going to still these voices of socialism or stop the trend towards socialism or statism, and preserve our electric industry merely through wishful thinking. It will be through our efforts alone that we succeed. That is why I say it is time to stop and ask ourselves, "What are we selling for?"

Sell to Survive

You and I know that our industry has done a magnificent job. We are confident that, in the era ahead, our industry will continue to measure up. I believe that efforts to socialize our business, as a step in the process of socialization of all business, will fail. But I also say to you that this will happen only if our companies, those serving in metropolitan areas as well as those in the most remote rural areas, maintain dynamic sales organizations, instructed and empowered to promote broad social objectives which will lead as rapidly as possible to the complete utilization of our service for the benefit of our people. The opportunity is ours. The duty is ours. The avenues are open to us. What we must do is to provide enlightened, aggressive sales leadership, which will convince the public that our interests are their interests, and that their best interests are common with ours.

The Sale We Must Not Lose

MERRILL E. SKINNER, Vice-President, Union Electric Co of Missouri

TODAY we are negotiating a sale we dare not lose, or we are out of business—out of a job. That sale, of course, is to the people of the United States. It involves their acceptance of business management for utility operation. If we lose this sale we can forget the rest of our problems because they will become the responsibility of someone else—presumably some agency of Government.

I suggest five questions I believe we should ask ourselves.

QUESTION NO. 1: *Have we taken full advantage in our companies of the valuable tool of sales training as we contemplate this selling job?*

In asking that question I suggest you think beyond the limited number of people in your organization who are classified as sales people, engaged in expanding the use of electricity among your customers—and consider the possibility of increasing the sales effectiveness of your entire organization in meeting this No. 1 industry problem, by giving them at least a nodding acquaintance with proper selling methods. Your own sales department should be able to put together an acceptable short course in basic sales psychology.

Is the Story Organized?

QUESTION NO. 2: *How thoroughly and intelligently have we classified and organized the advantages to the public of business managed utility operation and the disadvantages of other methods?*

J. W. McAfee, president of our company, pointed out some of the weaknesses in the opposition's arguments in a recent speech:

"Let us take the phrase 'public ownership.' What other kind of ownership can there be in this country? The only question of ownership is: Shall it be voluntary or involuntary? Will we continue to allow those who accumulate savings to choose for themselves what investments they will make, or will we, by the use of the taxing power, force the individual to be an involuntary investor in business?

"Another phrase is worthy of examination. It has a very appealing sound—'cheap power'. Is a thing made 'cheap' by concealing its cost with subsidy, by freeing it of the cost of supporting the normal functions of Government, and by allocating large parts of its cost to other objectives such as flood control, irrigation, etc?

QUESTION NO. 3: *Are we using our contacts with our customers to convert them into satisfied customers quickly?*

It is well to remember that giving good service at low rates may discharge our obligation as a service industry but such action of itself falls far short of any contribution to the problem under discussion.

QUESTION NO. 4: *What are the dominant buying motives which will be most effective in persuading each segment of the public to our point of view?*

Effective selling arguments can all be classed as appealing to one or more buying motives, and different people may buy the same thing for entirely different reasons. The dominant buying motive must be sought and discovered in each instance. That being the case, it might be well to review the arguments we are using to see which ones are likely to be most effective.

Recruit Our Allies

QUESTION NO. 5: *What can we do to get other groups to realize they may be next?*

One of our men is a member of a bridge club which includes several doctors. Recently, he reports a great change in the attitude of these men. Now they display the sympathy and understanding that come to people as they go through some hazardous experience together. We might now find some allies in the steel business. And there are other groups who should make common cause with us.

MERRILL E. SKINNER

Background of diversified engineering experience serves Merrill Skinner well in the commercial activities for which he is known throughout the industry. Graduate of the University of Wisconsin, he spent six years in the Westinghouse transformer design department, continuing with engineering responsibilities when he joined Duquesne Light Co in 1922 as assistant to the general manager, becoming manager of commercial department in 1924. He moved to the New York Power & Light Corporation in 1927. He remained with the Niagara-Hudson system companies, rising to vice-president in charge of sales of the Buffalo Niagara & Eastern Power Corporation, until 1946 when he transferred to Union Electric as director of sales. He was named a vice-president in 1948

HOW TO DESIGN • CONSTRUCT OPERATE • MAINTAIN

Conductivity Tester Reduces OCB Maintenance Cost

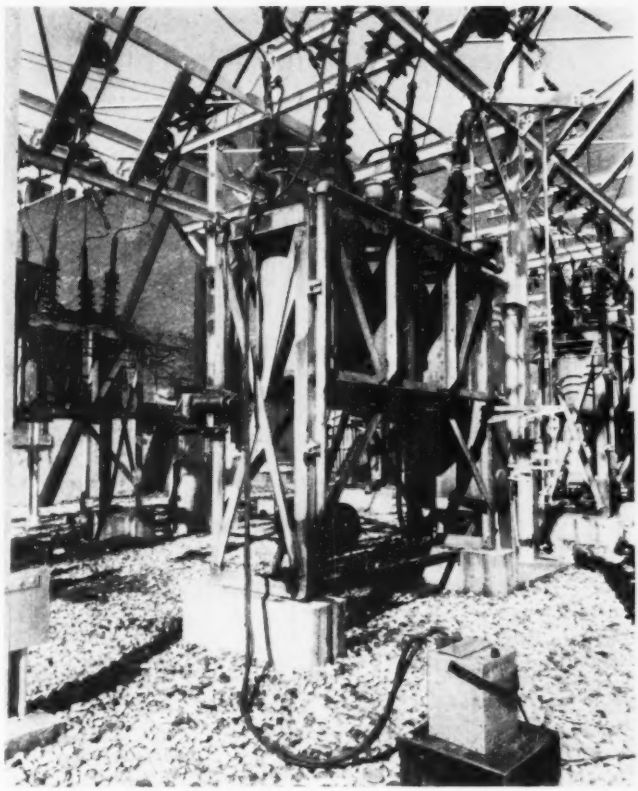
F. P. RHINE
Development and Special Testing Engineer
and
A. C. BAUMANN
Electrical Chief Inspector
The Detroit Edison Co

CONDITION of oil circuit breaker contacts can be determined without dismantling the breaker by means of an improved conductivity tester which measures contact resistance at load current ratings by the voltage drop method. Three important advantages are: (1) Results are more reliable than those obtained by visual inspection; (2) breaker outage time due to testing is only one-eighth of that formerly required; and (3) labor cost of breaker disassembly is eliminated.

Defects detected through use of the conductivity tester include:

(1) Loose screws in the shunt straps at the bushing cap terminals.
(2) Loose flanges in the interrupting chamber.
(3) Loose bolts in the contact fingers.
(4) High resistance connections due to oxide formations on contacts.
(5) High resistance terminal connections due to electrolytic action.
(6) High resistance contacts due to varnish between contact surfaces.
(7) A number of cases where the contacts were eroded and burned.

Practically all these defects would have gone unnoticed with visual inspection and would not have been detected with series test lamps.



NO DISASSEMBLY of 24-kv breaker is necessary because test circuit is connected externally. Allowable millivolt drops, at 150 and 200 amp for each type of breaker on the system, are obtained from tests on breakers known to be in good condition

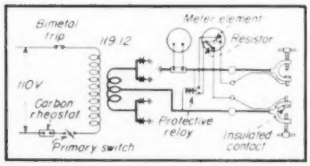
Other Measures

The tester is also used to test disconnect contacts and bus connections as well as to check commutator bar joints and armature coil resistance. A thermal trip on the primary side prevents damage to the instrument when used in these applications. This trip opens if secondary current of 200 amp flows continuously for 2 min.

The portable tester consists of a small, center-tapped transformer with selenium rectifiers in the low-voltage secondary. It produces a 200-amp d-c output from a 110-v a-c supply for an input current of 12.5 amp. This improved set has replaced original conductivity testers which measured contact resistance at 200 amp by a current comparison method.

Direct Current

Direct current is used because the iron in the current transformers in the breaker prevents accurate measurements with alternating current. Where battery capacity is available,



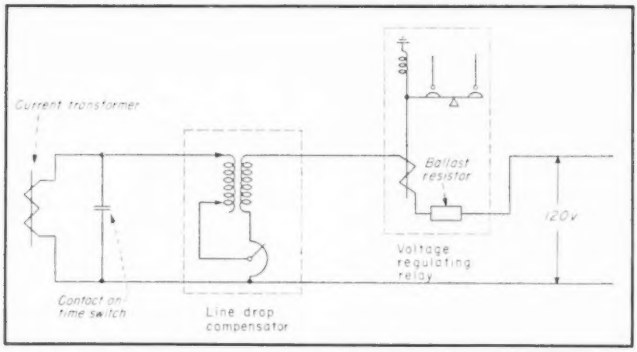
VOLTAGE-DROP METHOD of determining condition of circuit breaker contacts at load current ratings decreases maintenance and gives results which are reliable

a d-c type of tester has been used, but the a-c type is prefered because it can be used wherever there is an a-c supply.

Voltmeter Protection

With the d-c circuit, shown in the wiring diagram, connected across the pole unit of a breaker under test, defective contacts or an open circuit raise the voltage across the terminals of the breaker and milli-voltmeter. Therefore, to protect the meter, the protective relay is set to operate at or above two volts to short-circuit the meter. The resistor in the meter circuit limits short-circuit current through the relay contacts. Millivoltmeter range is also changed from 0-500 to 0-50 mv by a push button (not shown) which shunts this resistor.

Voltage Regulation Problem Solved by Time Switch



TIME SWITCH inserts line drop compensation in voltage regulating relay circuit during only part of the day to bolster the residential voltage supplied over an antiquated circuit

S. MINNECI
Power Transformer Engineer
General Electric Co
Pittsfield, Mass

A TIME SWITCH controls the line drop compensator to hold proper voltage for daytime industrial load supplied over a new circuit and for evening residential load supplied over an old circuit. This temporary expedient has helped one utility avoid voltage complaints until fundamental corrective measures can be completed.

On this system, one of the substations serves both a residential and industrial load in about equal proportions. The residential load is supplied over a rather antiquated circuit; but the industrial load is fed over another relatively new circuit, in which the various components are much more adequate for the load. The total load on this substation is practically the same during the evening as during the day. However, during the evenings the majority of the load is residential, and during the daytime it is industrial. During peak residential loads the residential circuit losses are appreciable, because of inadequate capacity. To compensate for the voltage drop, caused by these losses, a higher bus voltage is necessary at the substation in the evening than during the daytime when the residential load is light.

A regulating transformer with automatic load ratio control provides ±10% voltage regulation at the substation. A standard line drop compensator is utilized in the voltage regulating relay circuit, and is adjusted to hold the proper voltage for the evening residential load. But in the daytime, the compensator setting is not satisfactory for the daytime load. By utilizing a time switch to cut the line drop compensation in and out, as shown, proper voltage is maintained for the industrial users during their normal operating hours. With this arrangement the industrial voltages are high during the evening hours. However, most of these industrial users are shut down during this period, and apparently the utility company can get by with larger voltage fluctuations with industrial customers than it can with the residential customers.

Although this particular arrangement has improved voltage conditions, the utility company views the time switch as only a temporary solution. It plans to redesign and rebuild the residential distribution system as promptly as possible.

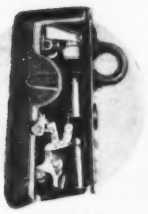
The permanent solution of this problem probably is to install feeder voltage regulators in the residential circuits and allow the line drop compensator to function on the automatic load ratio control transformer in the normal manner. Thus a reasonably uniform voltage on both the residential and industrial loads will be maintained at all times.

Impulses Reset Clocks After Interruption

J. L. WAGNER
Manager Electrical Laboratory
International Business Machines Corp
Endicott, N. Y.

WITH a new system developed, IBM unit clocks of the synchronous type are now kept in step with a master clock and each other by means of carrier signals superposed on the regular lighting or power wiring within a building. Uniform accurate time is thus provided throughout the establishment.

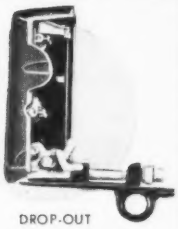
From a small electronic transmitter the impulse is picked up by a resonant filter in the clock, and am-



INDICATING

By Simply Changing Doors...

Four Cutouts in one!



DROP-OUT

RECLOSING

DISCONNECT

These General Electric enclosed fuse cutouts simplify your stocks. With *three interchangeable doors*, which fit both 5-kv and 7.5-kv housings, you get four operating functions—indicating, drop-out, two-element reclosing, and disconnect.

This is flexibility that spells real economy. By stocking only two housings and three doors, you can fill *all* your 50-ampere primary fuse-cutout requirements for circuits up to 12.5 kv Gr-Y—including a disconnect good for 100 amperes. The same flexibility is also available in 100-ampere cutouts, providing a 200-ampere disconnect.

When you need visual indication of a blown fuse, these are the cutouts to use. They are liberally designed—have permanently high dielectric strength, provide full-range interruption of fault currents and are conservatively rated as to interrupting capacity. All live parts are completely enclosed for maximum safety. For complete information, see your nearest G-E Representative, or write for Bulletin GEA-3448. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

Primary Fuse Cutouts for all Service Requirements

Non-indicating enclosed fuse cutout

Open-type cutout with drop-out fuse holder

Flip-open fuse cutout for rural lines

Oil fuse cutout for high interrupting capacity

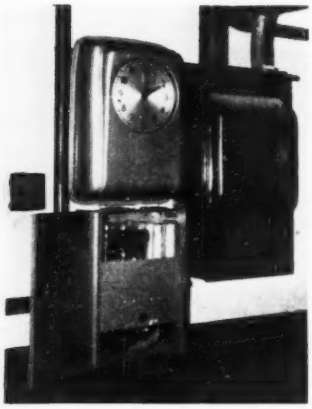


FIG 1—TRANSMITTER in cabinet comprises the impulse generator, control relays and low-voltage line coupling capacitors

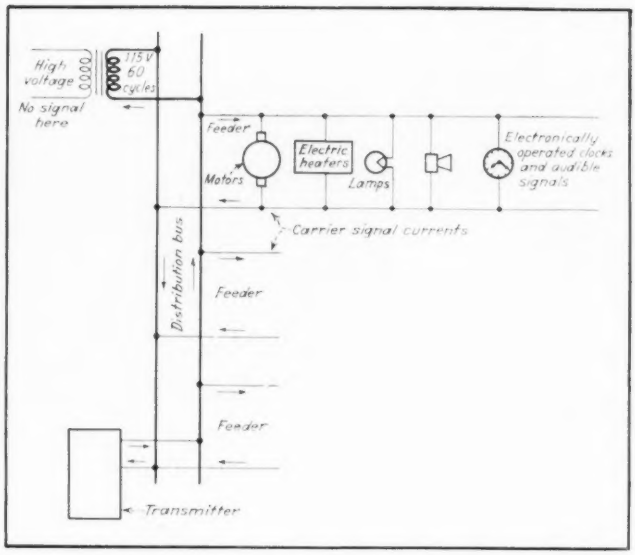


FIG 2—ELECTRONIC TRANSMITTER feeds clock-control impulses into typical interior light and power wiring system. Carriers from 2 to 6 kc are used to minimize absorption by 60-cycle load attenuation along distribution lines

plified sufficiently to fire a cold cathode gaseous discharge tube which conducts and in turn operates the clutch magnet of the clock correction mechanism. The correction mechanism consists of a latch type clutch device, which, when tripped by the impulse from the receiver, operates in conjunction with the synchronous motor drive, to check the positions of the hands and, if in error, to correct them in step with the master clock.

The receiver operates from relatively weak signals of the order of 0.5 v and consumes very little signal current, so that there is practically no limit to the number of clocks that may be operated.

The transmitter power required is determined principally by the 60-cycle load rather than by the number of clock units being operated. One transmitter will modulate satisfactorily a load of 200 to 500 kva depending whether the load is predominantly resistive or inductive.

The transmitter output is shunt fed through coupling capacitors built into the transmitter and arranged in groups to permit readily changing connections to accommodate single and 3-phase wye or delta systems.

Four frequencies in the range from 2 to 6 kc were chosen to minimize absorption by 60-cycle loads and to minimize attenuation along the distribution lines which occurs at the higher frequencies.

Rural Line Poles Raised With Transformers in Place

LABOR COST for rural line construction can be cut 20% by assembly-line methods and raising poles with transformers bolted in place. R. B. Swaner, Salt Lake City contractor, has realized this saving on rural line construction for Utah Power and Light Co by dividing construction steps between several small crews. Each crew soon becomes highly efficient in its few operations repeated many times over.

A pole truck and trailer carrying about 30 poles is first sent out to spot poles along the line to be built. A second truck spots transformers (20 or 25 units averaging 3-5 kva, per load) at required locations. Two men with a framing truck carrying a 110-v power supply and electric drill next install the crossarms, racks and hardware.

A crew of three men then digs the pole hole and sets the anchor with a mechanical digger. The pole is lifted enough to bolt the oil-filled transformer in place using standard hangars, and complete its connections. A guy wire is attached and the pole lifted upright and lowered into its hole. The hole is backfilled and the guy looped through the anchor and pulled up to approximate tension. Conductors are strung later and the guying adjusted to final tension. The pole is climbed only when the conductors are strung and the transformer primary tied in.

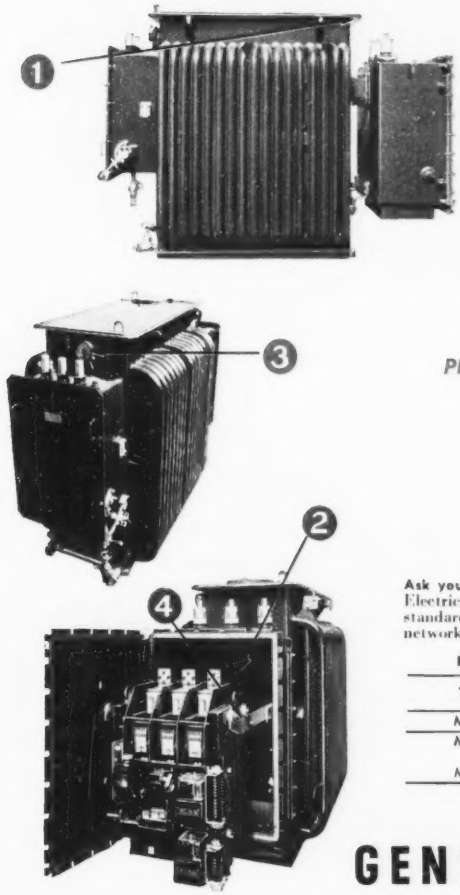
This method has been used successfully on rural lines for over two years. Transformers up to 15 kva have been raised in place with no oil leakage during the short time they are on their side. One big advantage in using the several small crews is the ease with which bottlenecks can be spotted and remedied. Any malfunctioning of men or equipment is immediately apparent since each operation, although independent, must fit smoothly into the overall schedule. The substantial savings in labor cost more than justify added investment in trucks and equipment required.

The a-c secondary network system is now recognized as *the* lowest-cost system for providing high-quality service to heavy load areas. While normally used for business sections of cities—50,000 or more in population—it will frequently pay its way in smaller towns as well.

But—to realize the full savings possible with networks, you must use standardized network equipment. For example:

YOU SAVE ON MAINTENANCE when you specify

Standardized Network Equipment



1 MAJOR GASKETS ARE ELIMINATED by welding, not bolting, transformer cover and switchbox to the main unit. Locating the tap changer behind a pipe plug eliminates a packing gland around an external shaft.

2 BUSHINGS can be removed externally, without opening the main transformer tank.

3 ALL TRANSFORMER ACCESSORIES—liquid-level gages, thermometer, tap changer, and all valves—are located at the high-voltage end of the transformer, easy to get to and check.

4 NETWORK PROTECTOR can be slid out on rails for quick inspection. Relays plug in—can be easily removed and replaced for checking.

PLUS FASTER DELIVERY—G-E standardized network transformers and protectors can be supplied on shorter delivery.

LOWER PRICE—G-E standardized network units are appreciably lower in price than non-standard designs.

LOWER INSTALLATION COSTS—G-E standardized network units are designed for narrower, shallower vaults, saving substantially in vault-construction costs.

Ask your G-E representative or write to Apparatus Dept., General Electric Company, Schenectady 5, N. Y. for full information on standardized network equipment. Bulletin GEA-5024 describes network transformers; GEA-2017, network protectors.

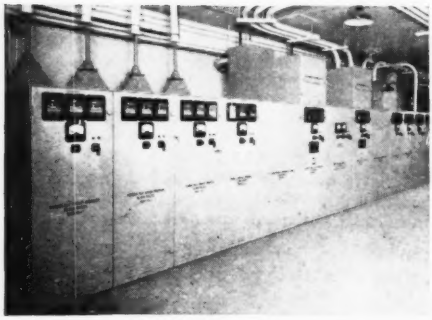
INCREASED Interrupting Ratings on Network Protectors

Type	Continuous Rating in Amperes	Interrupting Rating in Max. R.M.S. Amperes
MG-12	200 to 600	20,000
MG-8	800 to 1600	30,000
or	2000	35,000
MG-9	2500 and 3000	60,000

GENERAL ELECTRIC

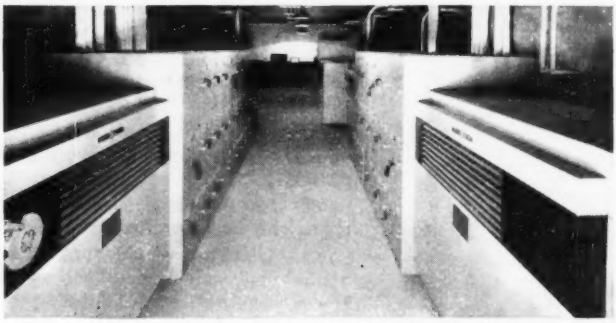
The Philadelphia Inquirer – *chooses*

Metal-clad and load-center



Metal-clad switchgear handles incoming power at 13.2 kv, distributes it to four load centers. Breaker line-up (left to right): 4 feeder breakers, metering compartment, incoming line breaker, tie breaker, incoming line breaker, metering compartment, 4 feeder breakers. Metal-clad switchgear is neat in appearance, saving in space. Note absence of any protective railing or fences around unit metal-clad construction offers operating safety to personnel.

Combination 3000-kva double-ended load center and electronic press drive control unit located on balcony. Windows on left overlook rotogravure press floor.



Two G-E 1000-kva double-ended load centers in basement of "Inquirer" Rotogravure Building. One unit is for lighting circuits, other for general power use. Transformers are modern dry-type, rated 500 kva. In right background is 13.2 kv metal-clad switchgear.

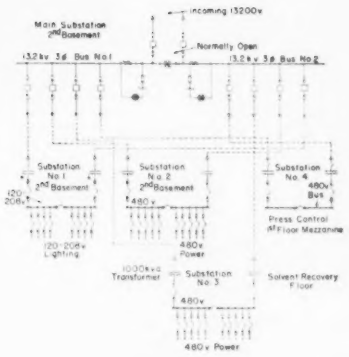
Double-ended dry-type load-center unit substation rated 2000 kva in solvent recovery room on top floor of "Inquirer" Rotogravure Building. Air circuit breakers are G-E Type AL-2-50 of 50,000 ampere interrupting rating. Horizontal grilles on transformer accentuate low, flowing lines of unit.

The "Inquirer" installation is a complete General Electric project one source of responsibility, plus the very best in planning, engineering, manufacturing, and servicing facilities to give maximum savings and efficiency to the customer.

Switchgear unit substations

for proved service reliability!

"Metal-clad switchgear and load-center power distribution was the most efficient way to get continuous, reliable power for our printing operations."
C. W. GINSBERG, Chief Production Engineer, Philadelphia "Inquirer"



At the new Philadelphia "Inquirer" installation General Electric metal-clad switchgear handles the incoming 13.2 kv through 11 power breakers (2 incoming, 1 tie, 8 feeder) of 150,000 kva interrupting rating. Eight feeders distribute the power to four G-E double-ended, dry-type load-center unit substations throughout the building where the 13.2 kv is stepped down to 480 volts for utilization—right at the center of the load area. Drawout air circuit breakers are used on all unit substations. Note that costly secondary feeders are short.

This secondary selective system assures the "Inquirer" of continuous power at only slightly higher cost than a simple radial system.

Be sure to see the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution." Ask your G-E sales representative to arrange a showing for your organization.

FOR CONTINUOUS-PROCESS OPERATIONS, **such as high-speed printing, you need continuous power. And with a General Electric load-center power distribution system like the "Inquirer" installation you get continuous power.**

Modern industrial power distribution systems using G-E switchgear and load-center unit substations are applicable to any industrial plant or commercial building where you want full-voltage conditions for top performance of equipment, an extremely flexible setup to take care of expanding or changing loads, adequate short circuit protection, safety to personnel, and low installation and maintenance costs. A complete system, using G-E switchgear and load centers, generally costs you less than a "piece-meal," makeshift affair.

"METAL-CLAD" **means just that—the entire switchgear structure is metal enclosed, thus offering operating safety to personnel. Note that there are no self-indicting protective fences or railings around metal-clad switchgear.**

The General Electric power circuit breakers, designed with adequate "IC" (Interrupting Capacity) for short circuit protection, are easily removable for inspection. This means less bother because when a breaker is temporarily out of service another can be quickly put in its place. Instruments and relays in the equipment are coordinated for positive protection of high-voltage feeders. And metal-clad switchgear is easy to install. It arrives factory-assembled—ready for final connection to power circuits.

UNIT SUBSTATIONS, **compact, fully-enclosed for safety, and built from matched components, are the basic "building blocks" of the load-center system. Flexible combinations of incoming-line and secondary-circuit arrangements from 100 to 2000 kva are available. Each is a complete unit with either dry-type or Pyranol* transformers plus G-E Type AK-1 or AL-2 air circuit breakers of the drawout type. Load centers are as easy to specify as a standard machine tool.**

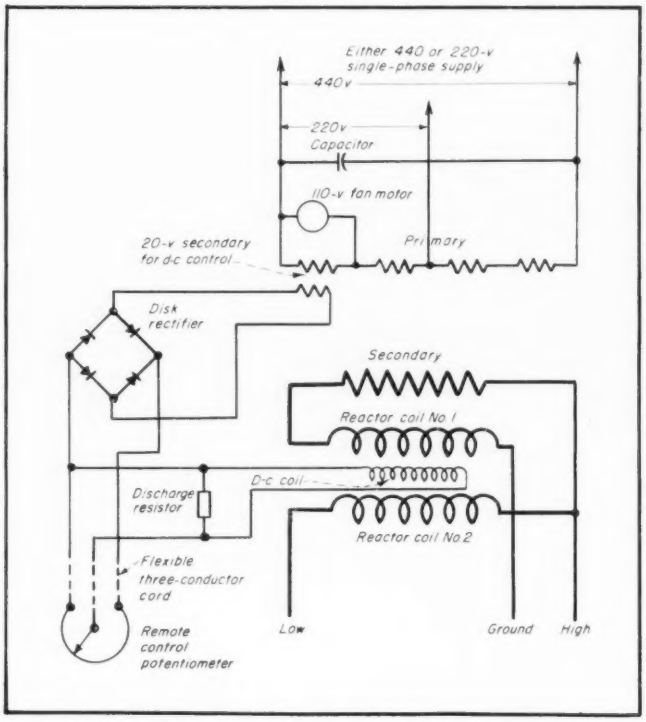
Investigate today the many advantages of using G-E switchgear and load-center unit substations in your plant for efficient, flexible power distribution. Contact your G-E sales representative for further information—and write for the helpful bulletins listed below. Apparatus Department, General Electric Co., Schenectady 5, New York.

GEA-3083 Metal-clad Switchgear
GEA-4966 Low-voltage Metal-enclosed Switchgear
GEA-3592 Load-center Unit Substations
GEA-3758 What Load-center Power Distribution Can Do for You
GEA-4507 Interlocked-armor Cable for Primary Circuits
GEA-4352 Flamenol* Cable for Secondary Circuits

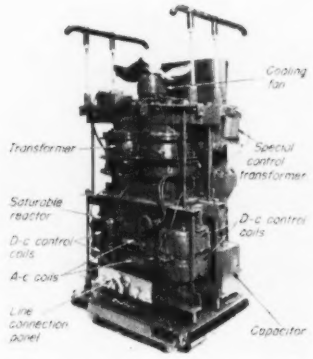
**Reg. U.S. Pat. Off.*

GENERAL ELECTRIC

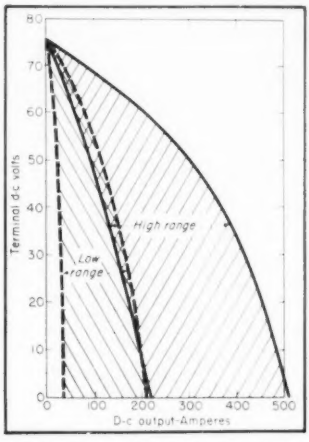
Remote Control Uses Saturable Reactor



REMOTE CONTROL of d-c saturable reactor permits regulation of welder output



SATURABLE REACTOR has d-c coils on two outer legs, a-c coil for load on center leg



DROOPING V-A CHARACTERISTICS are obtained over wide range

S. OESTREICHER
Chief Engineer
Welder and Motor Division
Harnischfeger Corp
Milwaukee

SIMPLE REMOTE CONTROL of a-c welder output is obtained by using a d-c saturable reactor instead of the usual manually adjusted air gap in the magnetic circuit.

The desired drooping volt-ampere characteristic of many a-c welders is produced by a reactor in series with the secondary of the welding transformer. Output regulation is controlled by changing the magnetic characteristic of the reactor core. In previous designs this variation was obtained by a mechanically moving part of the reactor core, thus introducing a variable air-gap in the magnetic structure.

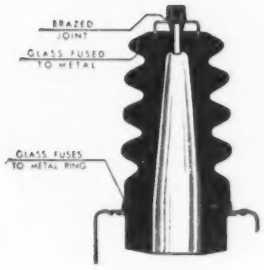
By varying the reactance of the series reactor electrically, instead of mechanically, the welding operator can use a small potentiometer right at his work to regulate the welder.

As shown by the circuit diagram, the potentiometer controls the d-c exciter coil that determines the (pre) magnetization of the reactor core. By adjusting the direct current, different values of a-c impedance are selected and output is varied as shown in the volt-ampere characteristic. Special design produces the correct starting characteristic and wave-shape for the welding current.

In the welder design, the transformer is placed on top of the reactor. The d-c control coils are around two outside legs of the reactor. The a-c coils, carrying the load current, surround the center leg. An air-gap between center leg and upper cross member of the reactor coil insures the desired wave-shape of the load current, ie, steep at the zero point instead of hesitating as with a conventional saturable reactor. In the smaller units, the potentiometers are removable and connected by extension cords. Larger units provide a receptacle for the remote control potentiometer. Special designs include high frequency stabilization of the arc and special control means.

Today Price is lowest in history

AND RELIABILITY THE HIGHEST!



Glass bushings have become one of the most talked-about features of G-E capacitors. These bushings, with the glass fused to a metal ring and the metal ring welded to the case, provide a permanent hermetic seal. Their high mechanical strength combined with this permanent hermetic seal, is improving still further the remarkable long-time record of dependability of G-E capacitors.

Thanks to a recent price cut on G-E 25-kvar units, capacitor prices per kvar are today the lowest in history.

And, while prices have steadily decreased since 1930, reliability has gone steadily up. Today, therefore, capacitors are one of the most thoroughly reliable pieces of equipment that can be placed on central station lines.

Concretely, here's what this means to you: Capacitors, which can be installed at less than ten dollars per kilovar, are—without question—one of the most worthwhile buys an electric utility can make. They can help you deliver more kilowatts—right now, in a matter of weeks. And since they normally constitute the ***lowest-cost*** method of increasing kilowatt capacity of generating plants, transmission lines, and transformer banks, they provide the way to "average down" over-all investment per kilowatt. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

407-1

Foundations for Wood Poles

I—Self-Sustaining Foundations and Concreting Methods

SELF-SUSTAINING FOUNDATIONS. Self-sustaining means to provide an unguyed pole (or stub) with adequate resistance to horizontal movement in the ground. At self-sustained deadends, angles and sidearm structures, poles (or stubs) whose horizontal loadings exceed those allowable for plain earth foundations shall be reinforced.

Joint-use 30-ft pole-stubs at T-corner alleys, and steel guy stubs shall be self-sustained.

Any pole supporting a transformer weighing more than 950 lb shall be self-sustained with crushed stone or equivalent to prevent sideward leaning of pole, unless adequately guyed.

Newly set poles having service take-offs in only one direction should be self-sustained or guyed to handle these service loads, unless counter-balancing services are expected before the following spring.

A self-sustained pole shall not be used at a partial deadend to handle longitudinal strains; however, this does not prohibit self-sustaining to handle the resultant of longitudinal tensions at an angle.

CONCRETING METHOD. Concrete for foundations shall be used according to the following instructions.

MIXING. Concrete shall consist of one part cement and five parts 60-40 gravel. This gravel should conform to specifications for medium grade and shall be 60% washed pebbles and 40% washed sand. All cement and gravel should be thoroughly mixed before any water is added. The final mixture shall have the consistency of dry, still paste. Extreme care shall be used not to add too much water. In freezing weather, warm water should be used.

These precautions are necessary in order to obtain a high early strength concrete and they are especially important in freezing weather.

Curing and Protection of Concrete for Pole Foundations and Anchors

Temperature, deg. F.	Required Setting Time	Production While Curing
Above 40	2 full days	Thin earth covering (2 to 4 in.) for 1 week.
15 to 40	3 full days	32-40 deg. 1 ft earth covering over few sheets of paper for 1 week.
		15-32 deg. 1 ft manure or hay (not straw) covering for 1 week.
Below 15	No concreting shall be done.	

PLACING. Concrete shall be placed before it has set enough to lose its plasticity.

For pole foundations and anchors, it is important that the tamping be sufficient to exclude enough air to obtain a densely packed mass. When the earth is backfilled over fresh concrete, care shall be taken not to disturb the surface of the concrete.

CURING. Procedure for pole foundations and anchors, see accompanying table.

Data to be presented in subsequent articles of this series are:

Seven kinds of self-sustaining foundations.

Charts for vertical or sinking load on poles in average soil and quicksand or marsh, and for horizontal or overturning load on poles.

Design of pole footings, which includes three examples to find—whether a pole requires a footing, the type of pole foundation required to hold deadend load, and the type of foundation required to prevent overturning.

An adaptation from overhead lines standards of Detroit Edison Co; beginning a four-part serial.

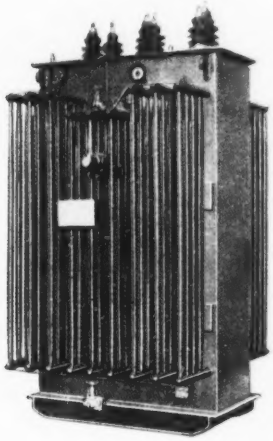
HERE'S GREATER ECONOMY IN POWER TRANSFORMERS

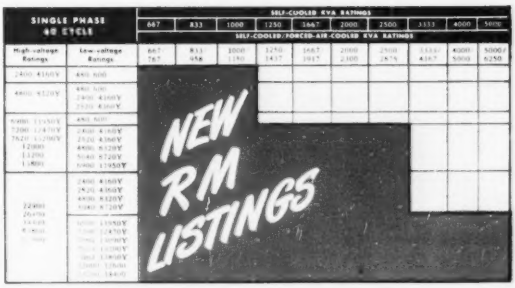
"RM" . . . Repetitive Manufacture . . . UNITS SAVE YOU TIME AND DOLLARS!

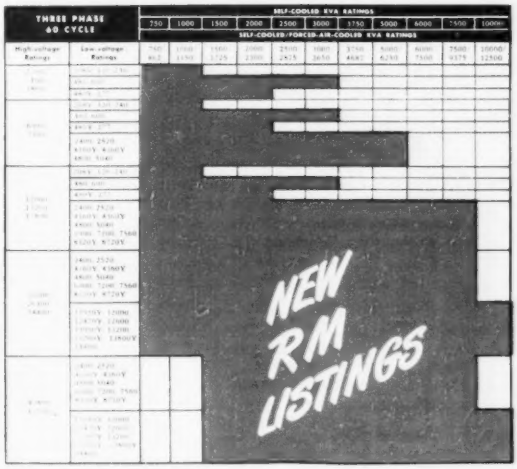
The "RM" power transformers listed at the right are standard designs that lend themselves to quantity production. The savings that result are passed on to you in shorter shipments and lower prices.

These "RM" units have E.E.I. NEMA preferred voltage ratings, and accessories in the most popular types and locations. Besides these standard items, additional high-voltage ratings and optional accessories are also available.

All this adds up to a flexibility that gives you more than 3000 standard ratings plus other optional ones a flexibility that offers you "RM" economy for practically all your small power transformer needs.







COMPLETE INFORMATION on the latest listings of RM transformers is in the hands of your G-E representative. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

401-4

GENERAL ELECTRIC

Notes on Fluorescent Lamps

R. G. SLAUER, Manager, Applications Engineering, Sylvania Electric Products Inc., Salem, Mass.

Characteristics, application features, and possible developments of different fluorescent lamps, generally referred to the 40-w T-12 as a comparison base. To refresh the memory—the present 40-w T-12 is 48 in. long, 1½ in. diameter; is rated, without auxiliaries, 100 v, 0.42 amp, approximately; has output of 50-55 lpw, has brightness of around 1,750 ft-L, has a life depending on use ranging from 2,500 to 10,000 hr

1. 40-W T-12 Preheat

This basic lamp (at least 61% of national production) represents an excellent engineering balance between cost, efficiency, ballast size, ballast losses, fixture size, etc. The suggestions for modification revolve around instant starting, more positive support by lampholders and longer unbroken lengths for continuous rows of light.

2. 40-W T-12 Instant Start

Identical in appearance with the 40-w T-12 preheat, this lamp is designed for instant starting at secondary ballast voltages approximately double the preheat type. By doing this, slight penalties are incurred in the size, cost and losses of the ballast and in the life of the lamp. Perhaps because the lamp is exactly the same in appearance as the preheat lamp and yet slightly more costly to use (lamp, fixture, and operation) popularity has not been very great.

3. 100-W (85-W) T-17 Preheat

The 100-w T-17 preheat lamp has been used almost exclusively for industrial lighting, apparently because of its suitability in rooms with higher ceilings. Only recently have several manufacturers made standard commercial fixtures employing this lamp. In general, its life has been long, considerably above manufacturers' ratings. However, it suffered by its relatively low efficiency (20% below the 40-w) which resulted from the design goal of high watts per foot (20 instead of 10) and consequent high total output.

Within the past year, krypton filling gas instead of argon has been introduced. For the same lamp performance, this reduces the required wattage to 85 and therefore brings its efficiency much closer to the 40-w lamp. The 100-w and 85-w lamps are interchangeable in the same luminaires because of balanced voltage-current ratios.

4. 40-W T-17 Instant Start

In an attempt to lower the surface brightness of the fluorescent lamp, particularly as a protection from reflected glare in 20 to 50-ft-c installations, this lamp was introduced. Physically it is the same as the 100-w; in other regards it is similar to the 40-w.

The magnitude of improvement is so small and the over-all cost penalty so great that the lamp has not been widely accepted by designers of lighting installations.

5. 25-MM Cold-Cathode

Sign lighting by luminous tubes has been predicated on high-voltage, low-current operation of long lengths. Basically however there is no reason why currents up to 120-150 ma are not feasible for specific length lamps (eg, 8 ft) equipped with typical shell electrodes. These can be operated either series or multiple.

The life of such lamps is appreciably longer than those using thermionic electrodes but it is usually accepted that the efficiency drops 15% to 25%. Lives of 20,000 hr are sometimes claimed but these seem to be confined to series circuits and only with very appreciable drops in efficiency and output during this life. From the over-all standpoint, the low wattage (and output) per foot is a handicap for many high level lighting applications.

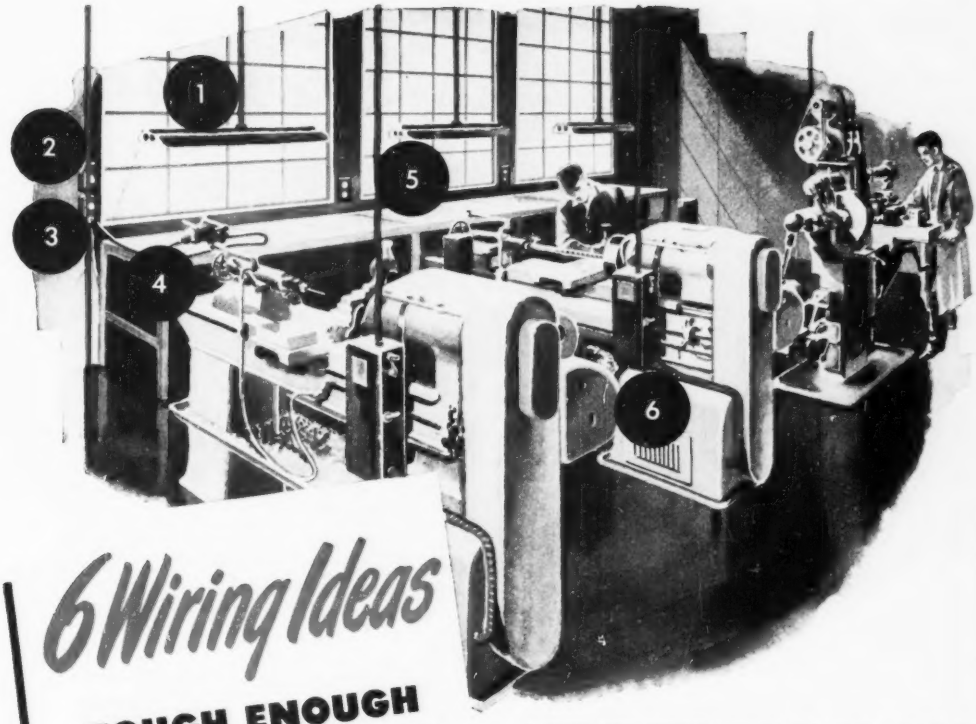
6. Slimline

This is a group term applying to several specific lamps. They differ from the standard 40-w lamp in slenderness ratio, in instant starting, in their single-pin base, and in their lower watts per foot. For a given length, the lamp is designed for operation at different currents depending on the ballast used.

Their long length permits continuous runs with less "breaks" due to sockets, although the latter are somewhat longer than those used for 40-w lamps. By employing end pressure, the lamps are held more rigidly in place than is true with the customary side insertion for double pin bases. Instant starting depends on higher ballast voltage and therefore ballasts are proportionately longer, with greater losses, and more costly.

The 8-ft long, 1-in. diam lamp was introduced first. To get maximum effectiveness of over-all fixture design, 300-ma rather than 200-ma operation is preferred. However this tends to overload the lamp resulting in somewhat lower efficiency. More important, it makes the lamp susceptible to lowered output when too closely confined in fixtures because of trapped heat.

Recently the 8-ft lamp was redesigned for a 1⅛-in. diam tube and 425-ma operation. This improves over-all efficiency and permits a wider range of application. The extra tube diameter does not seem to be a limiting factor in any but very special architectural applications.



6 Wiring Ideas

TOUGH ENOUGH FOR TOOLROOMS

Cutting costs is the toolroom's job. And all wiring material in a toolroom has got to be tough enough to work economies every step of the way.

That's why we've picked six cost-cutting General Electric wiring materials right off your distributor's shelves to help you get full value out of every dollar.

1. **HEAT-RESISTANT** Deltabeston* wires go a long way toward reducing maintenance. Made for locations like this, where ambient heat and high-level lighting circuits are a problem, Deltabeston wires are a "must" for every shop. Consider Deltabeston wires and cables for all circuits where heat is a threat, and wherever high current densities are involved.

2. **HEAVY-DUTY SWITCHES** selected from the complete General Electric line have the toughness it takes to stand up in a toolroom. They're totally enclosed to keep out flying chips and dust—built to take a beating day after day. Choose the switch for the job you want to do from General Electric's wide range of 20- and 30-ampere types.

*Trade-mark Reg. U. S. Pat. Off.

3. **HEAVY-DUTY OUTLETS** have got to be tough, too, to take the abuse of a toolroom. Three-wire outlets from the General Electric line are available in types to meet the most difficult specifications. Sturdy construction and tough materials are used throughout in these heavy-duty units.

4. **PORTABLE CORDS**—General Electric Flamenol* portable cords are proving that they can take it every day on jobs like this. Thermoplastic jacket has the flexibility and strength needed for tools that are constantly in use. These cords take hard knocks and abrasion in their stride—resist acids, alkalies, water, and oil. Use Flamenol portable cords for reduced maintenance on medium- or heavy-duty tools.

5. **BUS DROP CABLE** is another tough item from General Electric's line of wires and cables—designed to take a beating in a difficult spot. Neoprene jacket takes plenty of abuse—flexes easily for installation in problem locations—stays in for a long, long time.

6. **FLEXIBLE CONDUIT** is the protection you need on motors and motor-driven tools. Wherever there's vibration or movement, use General Electric flexible conduit. Its strip-wound construction lets it move with the tool—steel gives it the strength wiring needs for protection.

These are just a few of the tough, long-life items in the complete General Electric wiring materials line. Your distributor can supply you with these or any of the other materials you need to do your job well. Ask him about them, or write for information to Section K15-627 Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

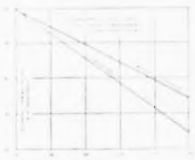
GENERAL ELECTRIC

The inside story about

MOLONEY *HiperCore* DISTRIBUTION TRANSFORMERS

The inside story about Moloney HiperCore Transformers is centered around the material used in the cores. By using highly efficient oriented silicon steel it is possible to work the cores at higher flux densities than formerly. With the *total* flux requirements remaining practically unchanged, working the oriented steel at higher densities than practical with ordinary silicon steel, results in smaller cross-sectional areas of cores with a consequent reduction in weights.

The smaller cores permit the use of smaller windings, smaller tanks and less oil. This results in lighter weight and smaller transformers which are easier to install and handle generally, and take up less space on the poles. Reductions in size and weight have been made without sacrifice in all-around performance. In fact, HiperCore Transformer operating characteristics are better . . . voltage regulation has been improved . . . greater short-time overloads can be carried.

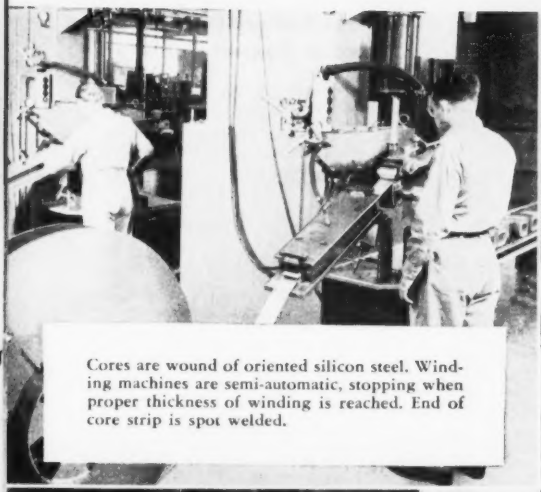


Illustrated are a few of the operations involved in the manufacture of HiperCore Transformers indicating the careful attention given to every detail in order to assure unexcelled on-the-job performance.

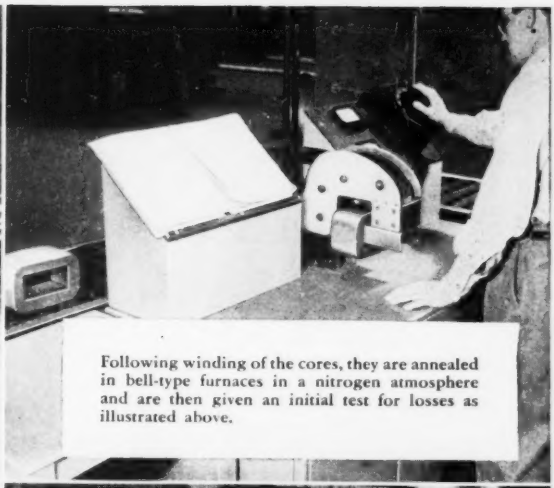
ME49-10

Testing voltage ratios at various tapchanger settings, to make certain that tap leads have been connected to proper studs, and that inter-coil connections are correct.

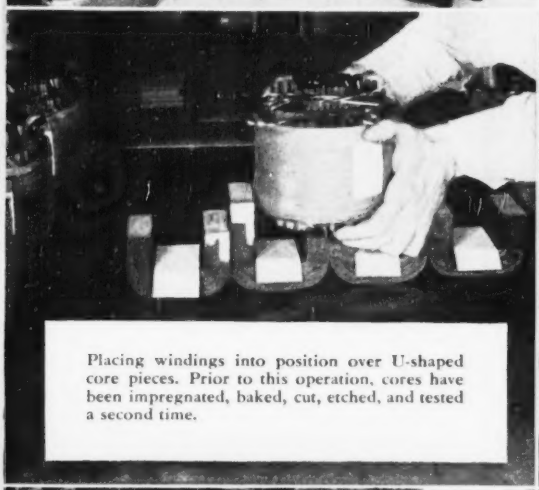
Placing core-and-coil assemblies in tanks after they have passed through oven which removes any moisture which may have been absorbed from the air, and also cures adhesive on core faces.



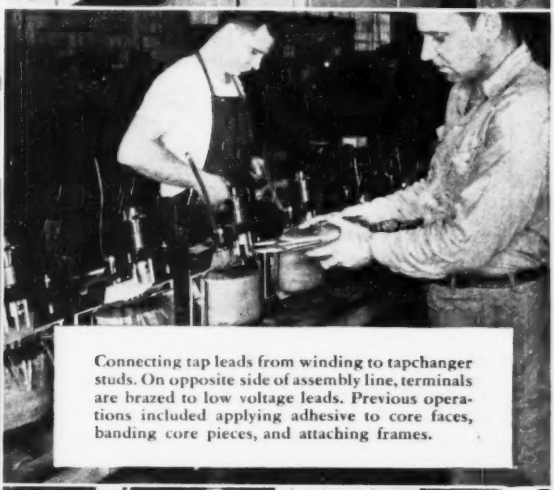
Cores are wound of oriented silicon steel. Winding machines are semi-automatic, stopping when proper thickness of winding is reached. End of core strip is spot welded.



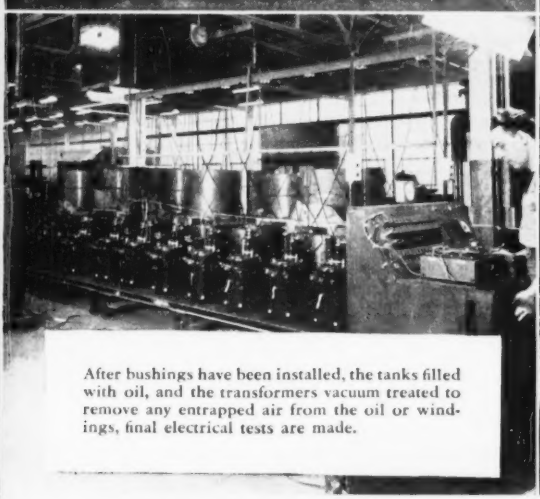
Following winding of the cores, they are annealed in bell-type furnaces in a nitrogen atmosphere and are then given an initial test for losses as illustrated above.



Placing windings into position over U-shaped core pieces. Prior to this operation, cores have been impregnated, baked, cut, etched, and tested a second time.



Connecting tap leads from winding to tapchanger studs. On opposite side of assembly line, terminals are brazed to low voltage leads. Previous operations included applying adhesive to core faces, banding core pieces, and attaching frames.



After bushings have been installed, the tanks filled with oil, and the transformers vacuum treated to remove any entrapped air from the oil or windings, final electrical tests are made.

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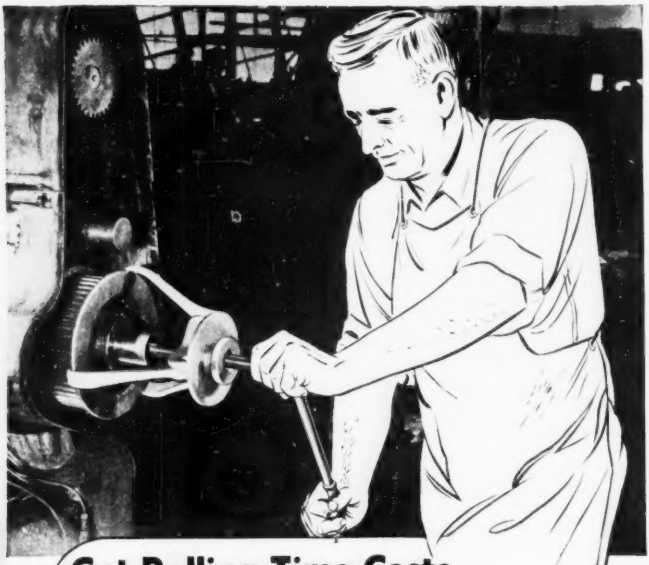
ELECTRIC CO.

Sales offices in all principal cities

FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONTARIO, CANADA

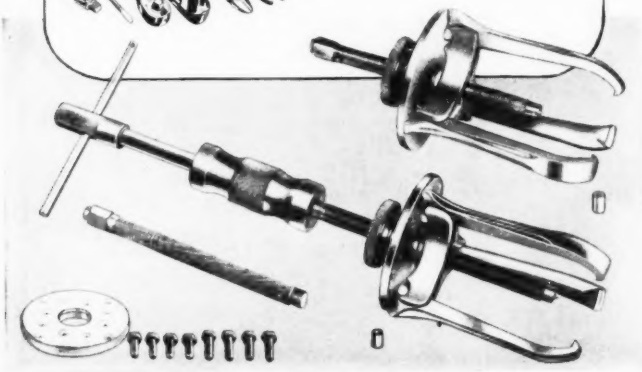


Cut Pulling-Time Costs
with Snap-on's
Powerful THREE-JAW PULLER

This mechanic is removing the chain-driven main drive gear on an automatic screw machine. Note how the jaws spread to grip the wide chain-retaining flange. The circular locking plate tightens the jaws so that the puller holds its position without being held by the mechanic, leaving both his hands free for a fast, easy and safe pulling.

Efficient jaw capacity is 8½" on outside holds with a minimum of 2½" diameter opening for inside pulls. Different sets are available for conversion to a screw, slide hammer or combination type puller. Snap-on has 40 direct factory branches in key industrial centers. Write for data sheet and name of nearest branch.

SNAP-ON TOOLS
CORPORATION
KENOSHA, WISCONSIN
8108-F 28TH AVENUE



Reverse Battery Polarity Avoids Control Corrosion

J. H. KINGHORN
Head of Relay and Protection Engineering Section, American Gas & Electric Service Corp
New York, N. Y.

THE most direct method of eliminating electrolytic effect, and the one used in most modern stations, is to reverse the flow of leakage current, so the current flows from the ground to the metal. This is assured by connecting the coil circuit to negative instead of positive battery polarity. This method has been employed for a long time by the telephone companies and has more recently been advocated by large apparatus manufacturers. To make the change in all existing power plants and substations which still have the old customary connections, would involve a great deal of time and expense. This does not appear justified if only a small number of coil failures are to be avoided. The decisions as to whether existing stations should be changed should be dictated by the factors present in each particular case with due regard to economics and operation.

In small stations the change may be relatively simple and consists of little more than interchanging the leads from the battery to the control bus. Due care must be exercised to keep the charger polarity correct and to change the polarity marking on the various terminal blocks. This change of leads, of course, may leave some coils, such as relay target, or some auxiliary relay coils located at the switchboard connected to positive. In most cases it is not believed that this will be a serious hazard because there is generally very little moisture condensation on switchboard equipment. If it is a factor, the changeover even in small stations would become more complicated.

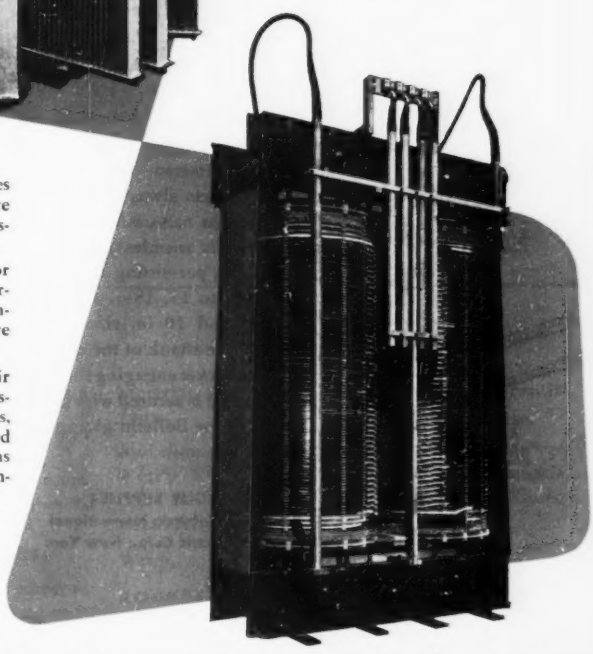
In larger stations even the minimum changes involve considerable work, and they are further complicated when electronic apparatus or

Corrosion of coils and resistors in closing and tripping circuits located in outdoor apparatus is an occasional source of trouble in generating station and substation equipment. Some steps to minimize the trouble were outlined in an article entitled "Minimize Corrosion of Control Devices" (EW, May 7, 1949, p 98).

Wagner Transformers on the job . . .

16,667 kva power transformer

Single Phase, 60 Cycle
72,000 to 6,600 volts

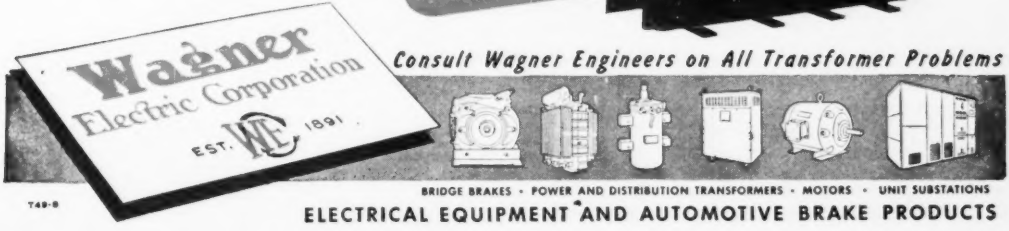


Wagner, with a background of almost six decades of transformer manufacturing, has the experience and facilities to make the building of power transformers part of the day's work.

Wagner Power Transformers are known for their *proven* dependability because they are liberally designed with extra factors of safety, constructed of carefully selected materials, and are expertly engineered, built, and tested.

Users of power transformers will find it to their interest to consult Wagner on their next transformer installation. Twenty-nine branch offices, located in principal cities and manned by trained field engineers, are ready to serve you. Bulletins TU-180 and TU-181 give information on the complete line of Wagner Transformers.

Wagner Electric Corporation
6456 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.



Consult Wagner Engineers on All Transformer Problems

BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

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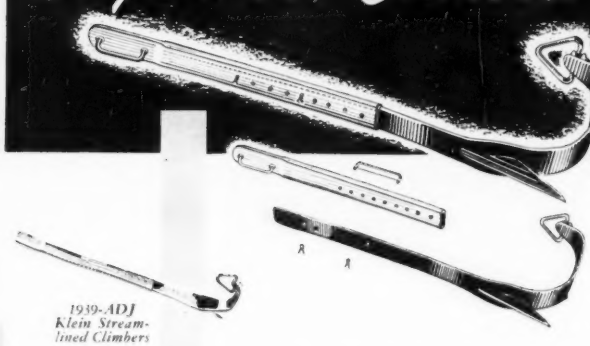
T49-B

KLEIN
Adjustable Climbers



1939-ADJ Klein Streamlined Climbers

1901-M-ADJ Klein Standard Climbers

1903-ADJ Klein Lightweight Climbers

1945-ADJ Klein "Polemaster" Climbers Matched right and left

Adjustable climbers do away with the necessity of stocking many sizes. They assure proper fit both in summer when light shoes are worn and in winter when heavy overshoes are needed.

Klein Adjustable Climbers are made of forged steel, individually tempered and tested—the same high quality that has always been associated with the name Klein. Adjustable sleeve is seamless, one-piece construction, permitting climber to be adjusted to 15, 15½, 16, 16½, 17, 17½, and 18 in. sizes. It is secured to the shank of the climber by a steel bracket engaging through two holes and is secured with cotter pins. Write for Bulletin giving full information.

ASK YOUR SUPPLIER
Foreign Distributor: International Standard Electric Corp., New York

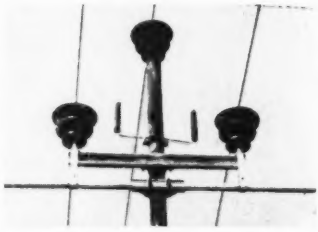
This Bulletin giving complete information on Klein Adjustable Climbers will be sent on request.

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVE. CHICAGO 18, ILL.

polarizing coils exist which must be kept unchanged. If new apparatus in old stations were reversed while old equipment was left unchanged, a great deal of confusion might result.

On completely new stations control-circuit installations are favored with coils connected to negative wherever possible. But new additions to existing stations are generally made according to the old standards so as to preserve uniformity in any single station.

Design of Bird Guard Used in South Africa



BIRD GUARDS used on 33-kv line. Tubular crossarm below power crossarm carries protective netting. Another guard, clamped to pole between the two lower insulators, is an iron rod mounting two 12-in. porcelain tubes on vertical legs, adaptable to any pole

INTERRUPTION of service on overhead lines caused by large birds is one of the problems encountered by the Electricity Supply Commission, Johannesburg, South Africa. To minimize that trouble two types of bird guards have been developed and are shown in the illustration.

Design and application of the guards is explained in an article entitled "A Novel Type of Scare Crow" appearing in a report "Twenty-Five Years, A Record of the Origin, Progress and Achievements of the Electricity Supply Commission, Union of South Africa, 1923-1948". The article is quoted.

"Big birds can interfere in a number of ways with the continuity of operation of overhead lines. The line equipped with pin-insulators on steel poles and cross arms, and serving a system with grounded neutral is particularly vulnerable. Two very usual causes of bird faults arise when the bird alights on the crossarm and then picks at the wire; or when it selects an insulator as a temporary

Large Utility Company

Cuts Cable Installation Costs

up to 50%

. . . and gets 10% greater current carrying capacity!

For its recently built new boiler and turbine room, a well-known electric utility company chose to wire the installation with ROCKBESTOS A. V. C. spiral armored multi-conductor power cables.

Experience in its old plant had taught this company that the cost of installing interlocked armored cable is less than one-half that for cable in conduit.

Moreover, current carrying capacity of 3-conductor spiral armored cable is safely indicated to be 10% greater than three single conductors in conduit with normal occupancy.

Material, time and labor savings like these can be yours.

And they can be more dependably yours when you specify ROCKBESTOS A. V. C. — the original cable with the *permanent* insulation of impregnated felted asbestos.

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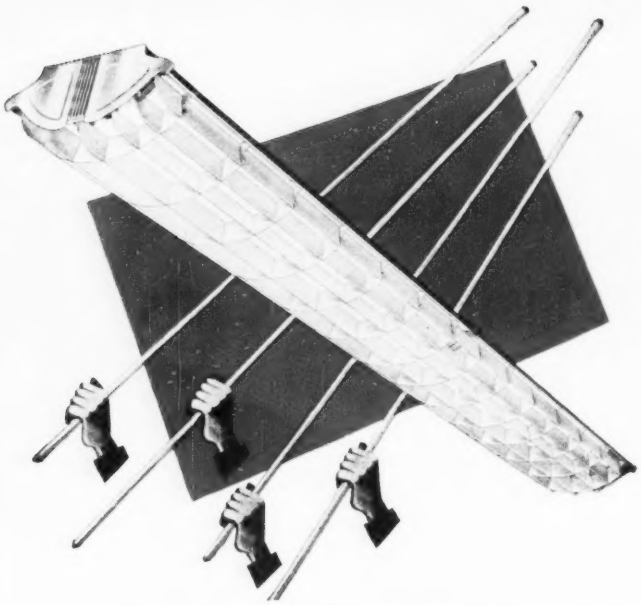
ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONN.

New York	Cleveland	Detroit	Chicago
Pittsburgh	St. Louis	Los Angeles	Oakland, Calif.

WIRES and CABLES by

ROCKBESTOS

. . . . . *dare* to be better



GUTH SLIMLINE TRUCOLITES*

with the New 75W Slimline Lamps
Open a New Lighting Sales Horizon!

The new 75W T-12 Slimline Lamps produce more lumens per foot! The new **Guth Slimline Trucolite** delivers more of these extra lumens to the working area.

Its reflector is a time-tested, superior light producer—the first Slimline fixture with downlight reflectors for maximum footcandle results.

It is easy to install—even one man can do it! It is versatile, for 2 or 4 lamps—for 200, 300 or 425 MA. operation.

Cash in on the profit-packed **Slimline** advertising—send for Bulletin 852-H from

939

Guth LIGHTING

YOUR TEAMMATE IN *precision-planned* LIGHTING

THE EDWIN F. GUTH COMPANY / ST. LOUIS 3, MISSOURI

*®—U. S. Patent Nos. 122586, 2331774

Leaders in Lighting since 1902

perch, and a wing makes contact with the pole whilst the claws are on or near the conductor. It is scant consolation to know that the offender is punished swiftly and remorselessly.

"Various remedial measures have been put forward, such as insulating covers on the crossarm, to deal with the first type of trouble. Such covers are usually not durable, and must be tailored to fit the job.

"Some of the Commission's lines pass near, or even through, cropfields where crows, owls and other birds of large wing-spread abound. A simple method was devised for dealing with this menace. It is based on the observation that these birds always alight with outspread wings. If it could be impressed on them that an obstacle prevented alighting in the accustomed manner they would no doubt seek another resting place.

"The device, for a delta configuration, takes the form of a galvanized iron rod bent into a shape approximating to three sides of a rectangle, and affixed to the pole in such a way that two legs stand vertical, while the remaining side is horizontal. The latter is shaped to fit round the pole, and is held in position by a clamp. The vertical legs rise roughly half way between the insulator (at the end of the crossarm) and the pole. The horizontal side of the assembly runs at a convenient distance above the crossarm. Each vertical leg carries a 12-in. long porcelain tube, graphited inside, closed at one end, and dropped over the rod, which is wrapped with waxed cord over a length of 2 or 3 in. from the end to ensure a snug fit of the tube.

"This assembly, which can be fitted readily to any existing pole, appears to furnish the desired deterrent against alighting on the insulator or the crossarm. Should a bird persist in making an attempt to perch on one of the lower insulators, the wing nearest the pole would touch the porcelain tube and not the metal pole.

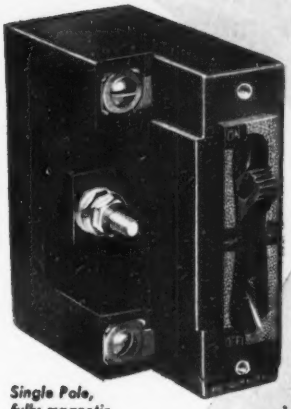
"Curiously enough, the only recorded case of bird trouble on a line so protected was caused by an owl which landed on the pole-top insulator. Something must have occurred to upset its balance; and whilst hanging from the conductor it came into contact with the pole. In this instance the owl was not destroyed, but was found *in situ* still pendant from the wire: mute evidence of the actual happening of an improbable event."

The DoALL Company wanted Flexible Protection

HEINEMANN

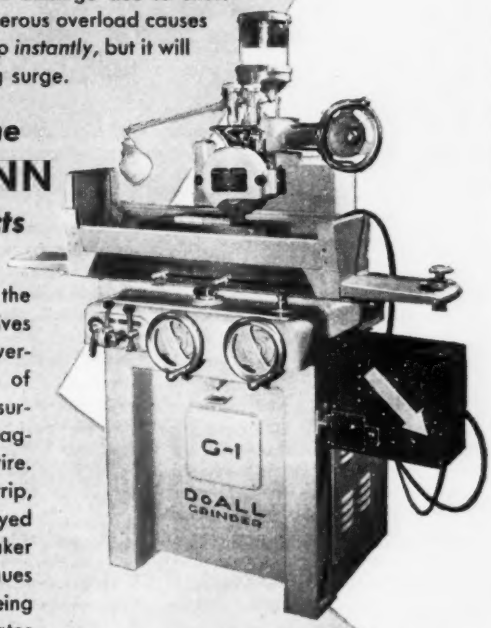
MAGNETIC CIRCUIT BREAKERS

were the answer!



Single Pole, fully magnetic with dual overload feature

The precision surface grinder shown below is advertised as giving "long, trouble-free service." Part of the credit for this must go to the HEINEMANN Auxiliary Circuit Breaker (position indicated by arrow) which at all times, and at no maintenance cost, stands guard to protect this machine from damage due to short circuit. A dangerous overload causes the breaker to trip *instantly*, but it will not trip on starting surge.



How The HEINEMANN Circuit Breaker Acts

Small enough to be "built in" to the machine, the breaker shown above gives positive protection against short or overload for any machine using motors of 1/100 H.P. up to 1 H.P. A plunger surrounded by a coil of wire becomes a magnet when current flows through the wire. Excess current causes the breaker to trip, but temporary overload permits delayed action of the plunger, and the breaker will not trip unless the overload continues beyond a predetermined time. Being *entirely magnetic*, the breaker generates NO HEAT and will carry full rated capacity.

Write For Further Information

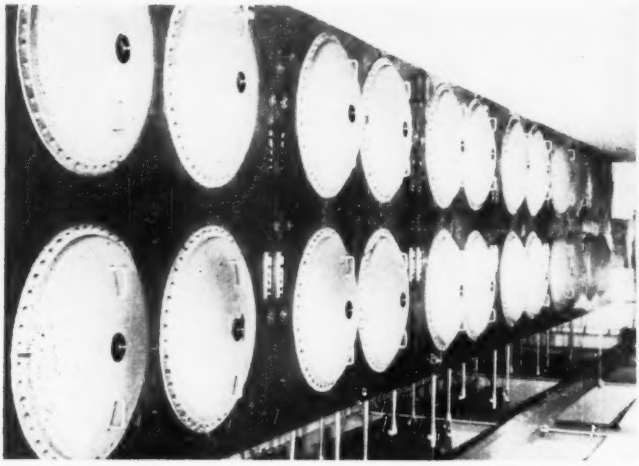
EST. HECO 1888

HEINEMANN ELECTRIC COMPANY

103 PLUM STREET **TRENTON, NEW JERSEY**

LOAD BUILDING

Ozone Purifies City Water Supply



OZONE GENERATORS change oxygen in air from O_2 to O_3 which is diffused through water to purify it. This type of load has high load factor and unity power factor input

WIRT S. SCOTT
Philadelphia Electric Co
Philadelphia, Pa

USE OF ELECTRICITY at a rate of 200 kwhr per million gallons is anticipated for ozone water purification at Philadelphia's Belmont pumping station which serves the western part of the city. About 70 million gallons of water per day will be ozone-treated when the ultimate installation at this location is in complete operation. Particular features of the load, that recommend it to the power company, are its characteristically high load factor and the unity power factor of the ozone generator input. The installation is interesting in its combination of four different electrical applications in one process.

In the diagram on page 106, incoming air, 2,000 cfm, is cleaned in electrostatic precipitators (1). Cycloidal blowers (2) circulate the air through the various pieces of process equipment, and deliver it to the tanks containing the water to be treated. In addition to the static head created by the equipment and piping, the air pressure must be sufficient to be released under 18½ ft of water. Each of the five 30-hp blowers (one spare) is rated 440 cfm at 10½ lb pressure.

Filtered air is cooled (3) from incoming temperature to approximately 48 F, resulting in a moisture content of 50 gr per lb. To accomplish this cooling and dehumidification, two compressors, each driven by a 25-hp motor, are used. One compressor is sufficient; the other is a spare.

The air is further dried (4) in four dehumidifiers of 1,000 cfm capacity, two in operation at one time, while two are being reactivated. Activated alumina is the absorbing medium. This brings the moisture down to 1 gr per lb. Every eight hours each of the dehumidifiers in use is replaced by one that has been reactivated. The reactivating process consists of blowing heated air through the moisture-laden activated alumina for 90 min. The air is electrically heated, using 90 kw of heaters, and is forced through at 10-oz pressure by two 5-hp 1,050-cfm turbo blowers.

There are 50 ozone generators (5). The main body of the generator unit is constructed somewhat like a fire-tube boiler, having a shell with two headers and numerous tubes between, with cooling water circulating around them. Each generator has 85 parallel stainless steel tubes, $\frac{1}{16}$-in. wall thickness, 3¾-in. inside diameter by 40-in. long. In each steel tube is a Pyrex glass tube, open at one end only. Spacer blocks center the glass tube in the steel tube, forming an annular space for air flow of approximately $\frac{1}{16}$-in.

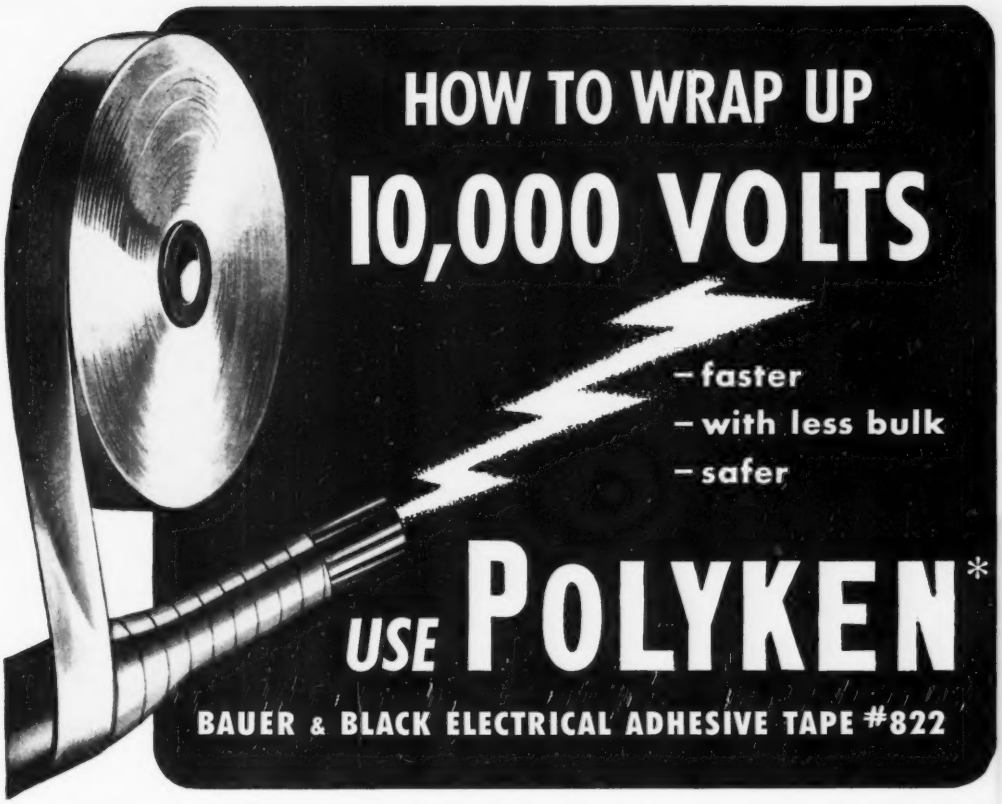
Graphite Coating

The inside of the glass tube is completely coated with graphite covered with a protective enamel. The graphite coating acts as one electrode and the steel tube as the other. Potential of 15,000 v is applied. Corona discharge in the spacing between the outside of the glass and inside of the steel tube ozonizes the air passing from one header of the unit to the other.

Each ozone generator has a rating of approximately 18 kva, 60% lead power factor. To reduce the capacity of transformer equipment required, each generator has its own reactor coil for unity power factor operation of the system as a whole. Each unit has its own transformer for stepping up the voltage from 460 to 15,000 v.

Diffusion

Ozonated air from the generators flows through stainless steel pipe to three ozone diffusion tanks (6). These tanks are of concrete, 25 ft sq, and hold a water depth of 18½ ft. Water enters over adjustable weirs at the top of one side of the tank and passes downward and across the tank. The treated air is diffused through porous plates at the bottom of the tank, and rises through the water.



Outstanding POLYKEN Features

- **Dielectric Strength:** Over 10,000 volts (9 mils thick)
- **Insulation Resistance:** Greater than 8 x 10^6 megohms conditioned 24 hrs. @ 27° C — 70% R.H.
- **Dielectric Constant:** 2.6
- **Power Factor:** .0050 (10^6 cycles)
- **Corrosion Resistance:** No measurable corrosion effect
- **Solvent Resistance:** No known solvent for No. 822's backing at room temperature
- **Water Transmission Rate:** 0.24 gms per 100 sq. in. in 24 hours continuous immersion
- **Corona Quenching Characteristics:** Exceptional

*Reg. U. S. Pat. Off.

SPLICE insulation of high-frequency apparatus is reduced to simplest terms with POLYKEN . . . revolutionary Bauer & Black Electrical Tape. For POLYKEN is a simple, efficient, all-purpose tape.

POLYKEN *#822 Tape is made of polyethylene . . . an oriented plastic film backed with a pressure-sensitive adhesive. Only .009" thick, it conforms closely to contours . . . reduces bulk. "At break" tensile strength is 22 lbs. per inch of width. A perfect moisture barrier, up to ten times more resistant than vinyl tapes . . . transmission rate only 0.24 gms per 100 sq. in. in 24 hours. Dielectric strength (well over 10,000 volts) often greater than that of cable. Resists corrosion and aging. Requires no mechanical wrap to make compact splices.*

A wonder tape? Yes and no. Yes, because it replaces many materials with one. No, because it is a typical product of painstaking, exhaustive Bauer & Black research, aimed at reducing costs, speeding and improving methods.

Easy to use, POLYKEN comes in handy rolls of many sizes. Get it from your local jobber. Or, for test samples, write POLYKEN, Dept. 6-6, 2500 S. Dearborn St., Chicago, Illinois.

A product of

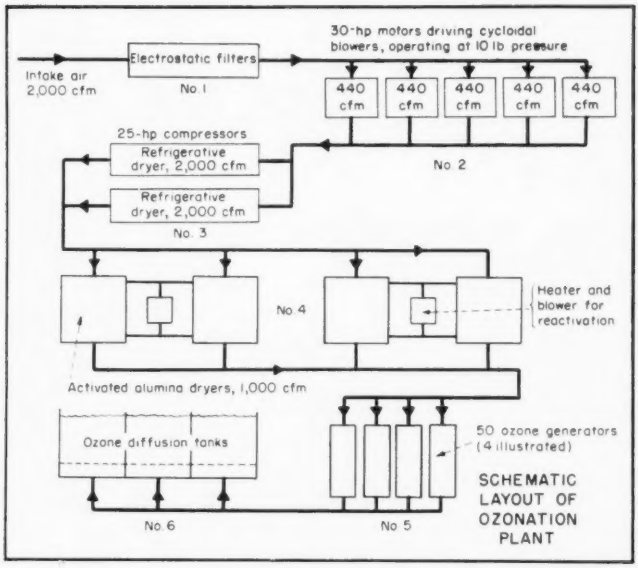
BAUER & BLACK

Division of The Kendall Company, 2500 S. Dearborn St., Chicago 16

Industrial Adhesive Tape

PRESSURE SENSITIVE

Production Short Cuts to Reduce Costs • Research to Speed and Improve Methods



FOUR DIFFERENT uses of electricity, air cleaning, power, heating, and ozone production are incorporated in water purification process. Sequence of operations is detailed in text

Ten-minute retention of the water in the tanks is normally required for ozonation. The present equipment is sufficient for treating 36 million gallons of water per day.

Power is supplied to this plant by the Philadelphia Electric Co at 13,200 v, 3-phase, 60 cycles, and is stepped down through three 250-kva transformers to 460 v.

Planned Leadership for Planned Lighting Revenue

J. M. STEDMAN
Pennsylvania Power & Light Co
Allentown, Pa.

RECENTLY the Pennsylvania Power & Light Co sponsored a series of four "Planned Lighting Clinics" to train more than 1,200 electrical contractors, architects and others in its territory in the technique of planning modern lighting installations.

The clinics were aimed primarily at improving the lighting knowledge of the electrical contractor, who is very often the most influential man in the lighting job. He usually sells a well-planned lighting installation down, rather than up. The result is loss in revenue to the utility, loss in sales to jobbers and profit to the contractor, and, worst of all, another poor lighting installation for the customer.

The four clinics were scheduled for presentation in ten towns in the company's area of over 9,300 sq miles, to cover each operating division, and were arranged to follow each other at intervals of about two weeks.

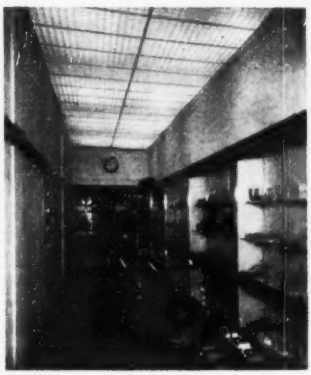
The first clinic featured a dramatic presentation of the Planned Lighting Program, a sound-slide film on the functioning of the eye and a demonstration showing the need for quantity and quality in illumination. Clinic No. 2 included a demonstration of light sources, emphasizing the newer lamps, and another film on proper planning of lighting installations.

The third clinic stressed typical layout problems encountered in store lighting, with lighting representatives of the electric company planning actual jobs on the stage. The lighting needs of industrial, store and office customers were also presented. Clinic No. 4 was entirely devoted to home lighting, with displays of light sources, adequate wiring, and the EEI sales training film on home lighting being stressed.

Clinics Bring Results

Total attendance at all four clinics was 4,352, 3,185 being architects, contractors and other members of the electrical industry, and the remainder, company employees. Resulting from the clinics are consistent requests from many contractors for help in planning lighting layouts. They have been very effective in persuading contractors to work closely with the electric company personnel in planning improved lighting installations.

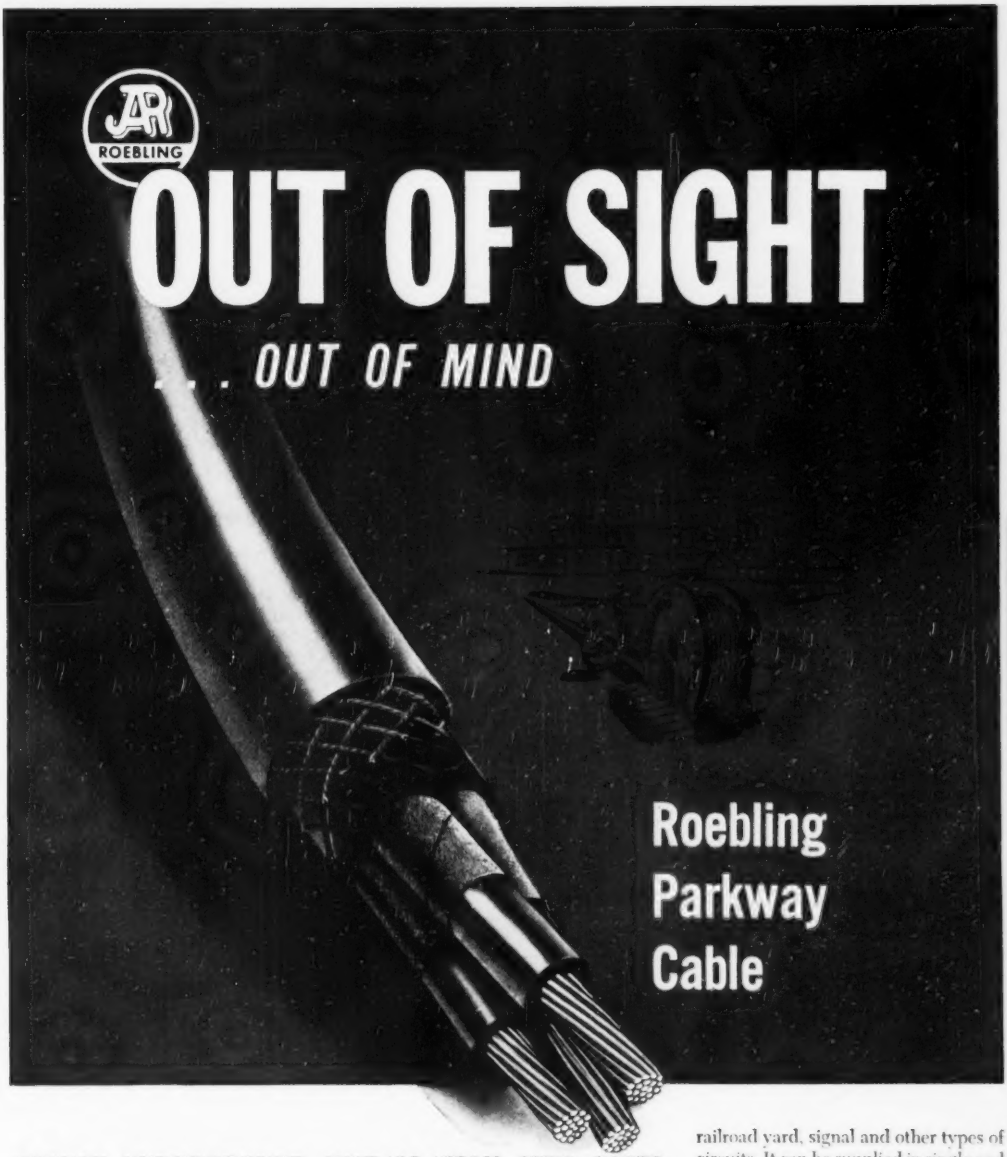
Makes Small Shop Look Larger



LOUVERED CEILING gives wider appearance to narrow store and improves lighting too

EFFECTIVENESS of the louvered ceiling in making a small store appear larger is demonstrated in the Gem Watch Shop, Raleigh, N. C. Increased customer traffic and consequent better business have resulted from the new lighting.

This ceiling installation, planned by G. O. Green, Carolina Power & Light Co, consists of 18 x 24-in. metal louver sections with 40-watt lamps in 2-tube industrial type fixtures. Above each case are R-40 incandescents to bring out sparkle and color in the jewelry displays. Lighting intensity was raised from 10 to 50 ft-c.



DIRECT UNDERGROUND INSTALLATION CUTS COSTS

YOU AVOID ALL THE EXPENSE of underground duct systems with Roebling Parkway Cable. It's laid directly in an economical two- or three-foot trench. And as soon as it's out of sight, your problems are over. Wind and weather can't bring service troubles . . . metallic armor or a non-metallic Roeprene sheath assures safe physical protection.

Roebling Parkway Cable is being widely adopted for series street lighting, parkway boulevard lighting, traffic signal, fire alarm, flood lighting, railroad yard, signal and other types of circuits. It can be supplied in single and multiple conductor types—either solid or stranded—in a range from 600 to 5000 volts.

Have your Roebling distributor or Roebling branch office help select the best cable for your special needs. John A. Roebling's Sons Company, Trenton 2, New Jersey.

WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. ★ ***Boston,*** 51 Sleeper St. ★ ***Chicago,*** 5525 W. Roosevelt Rd. ★ ***Cleveland,*** 701 St. Clair Ave., N. E. ★ ***Denver,*** 1635 17th St. ★ ***Houston,*** 6216 Navigation Blvd. ★ ***Los Angeles,*** 216 S. Alameda St. ★ ***New York,*** 19 Rector St. ★ ***Philadelphia,*** 12 S. 12th St. ★ ***Pittsburgh,*** 855 W. North Ave. ★ ***Portland, Ore.,*** 1032 N. W. 14th Ave. ★ ***San Francisco,*** 1740 17th St. ★ ***Seattle,*** 900 First Ave.

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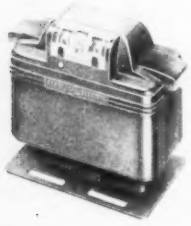
☆ *A CENTURY OF CONFIDENCE* ☆

NEW EQUIPMENT



Current Transformer

BUTYL-MOLDED TECHNIQUE has been applied for the first time to a revolutionary instrument current transformer, according to General Electric Co's Meter and Instrument Divisions, Schenectady 5, N. Y. The JKM-3 is designed for accurate indoor metering and relay services. Rated 5,000 v at 25-60 cycles, it is available with single primary in ratings of 10 to 800 amp inclusive.

Butyl compound provides a homogenous insulation that is resilient, oxidation-resistant, arc-resisting and moisture-resistant. Intimate contact of butyl compound with windings and special coil construction permit continuous operation up to 150% of rated load.

Primary terminals are silver-plated to reduce contact resistance. Secondary terminals are solderless clamp type. Transparent plastic terminal cover cannot be attached when short-circuit switch is closed and meters or other devices are attached.

•

Industrial Switch

FOR SEVERE industrial service, an enclosed switch, combining an electrical rating of 20 amp with an inrush capacity of 75 amp up to 460 v, a-c, is available from Micro Switch, Freeport, Ill. It is classified as BAF1-2RN.

An aluminum housing seals the switch from dust, dirt, moisture and oil or water splashes. Built-in overtravel mechanism insures long life and accurate repeatability of operating point. The unit may be mounted on top, bottom or back surfaces. It carries UL listing for several a-c ratings, including ¾ hp, 115 v; and 20 amp, 125, 250 or 460 v.

Tilt-Type Trailer

HAVING a 3-ton capacity, a tilt-type trailer for transporting ditchers, tractors or compressors has been announced by C. R. Jahn Co, 1106 W. 35th St, Chicago, Ill. It is Model JT-203.

Platform height of 14½ in. and good balance characteristic of the trailer make it possible for one man to load or unload the trailer, the company advises. An automatic safety lock holds loaded or empty platform in position.

Weighing about 1,800 lb, the trailer can be hauled by any standard ½-ton truck with a standard pintle. Accessories include reflectors, safety chains and lash rings. Electric brakes are optional.

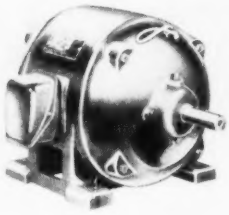
•

Extension Scaffold

CLEANING and maintenance in high, out-of-reach places can be readily accomplished using the Hi-Lift extension scaffold made by Atlas Industrial Corp, 849 39th Street, Brooklyn 32, N. Y. This unit starts as a 6-ft ladder and

can be extended by one man to a 20-ft scaffold in less than 5 min, or partially extended to any lesser height.

For maneuvering in tight places, the scaffold has roller bearing casters on all four legs. Outriggers are provided for extra stability. Scaffolds are furnished in any size to meet varying requirements, according to the company.



Single-Phase Motors

EMPLOYING a voltage relay in place of the centrifugal switch to disconnect the starting capacitors after motor is up to speed, a line of integral horsepower, single-phase motors is being produced by The Louis Allis Co, Milwaukee 7, Wis. A control cabinet furnished with each motor houses the voltage relay, an across-the-line starter and all necessary capacitors.

Available in open drip proof, splash proof, totally enclosed, fan cooled or explosion proof construction, these motors are capacitor start-induction run types in ratings of 1 and 1.5 hp and capacitor start-capacitor run types in 2, 3, 5, 7.5 and 10-hp ratings. Capacitor run types have oil type running capacitors mounted in control cabinet.

•

Central Station Units

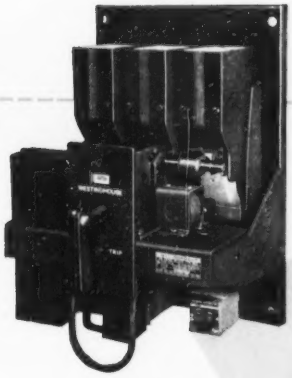
COMPACT central station units, for f-m radiophone communications systems in the 30—40 megacycle and 152—162 megacycle bands, are announced by The Industrial Division, Philco Corp, Philadelphia 34, Pa.

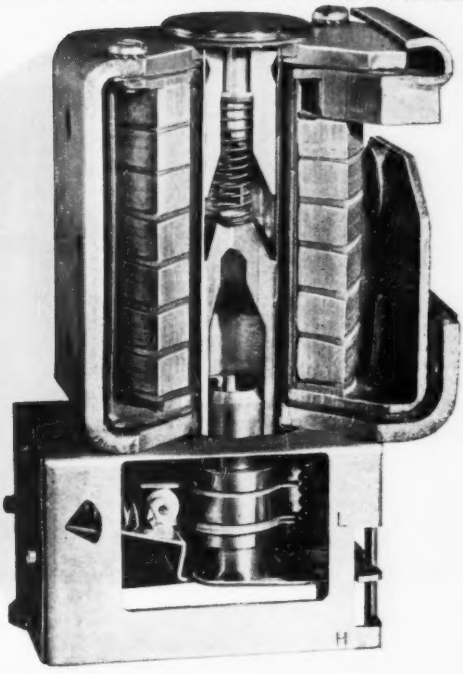
All essential equipment except microphone and antenna system is housed in a desk or wall mounting cabinet, 39 x 25 x 11¼ in. Equipment chassis are mounted on telephone relay rack, hinged at the bottom to permit access to rear of chassis by tilting equipment forward.

These units are intended for local control only. For 30—44 megacycle operation, either a 30 or 50-w transmitter is available. On the 152—162 megacycle band, transmitter output is 40 w. All units employ automatic deviation control to keep band-width of transmissions within assigned limits.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse





TRIPS.. **to protect**

DELAYS.. **to select**

the NEW DB Breaker Tripping Device

Here's a new overcurrent device that trips instantaneously on fault currents reaching a predetermined value . . . yet delays tripping on overcurrent caused by motor starting or other overloads of short duration. Also available—selective operation that causes only the breaker nearest a fault to trip. Breakers nearer the power source keep current flowing in unfaulted parts of the circuit.

This tripping device is the "mainspring" for the new Westinghouse DB Breaker—a breaker that's smaller, more dependable, more flexible, and has a longer life. Get top breaker performance, plus "one-unit" overcurrent protection, in your low-voltage system. Install the DB.

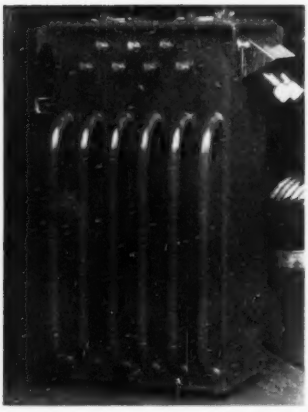
Here's the COMPLETE Story . . .

Get answers to your questions, plus complete information from the new DB Breaker Booklet. Ask your Westinghouse representative or distributor for B-4067. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60720

Westinghouse

"DE-ION" CIRCUIT BREAKERS

New Type DB

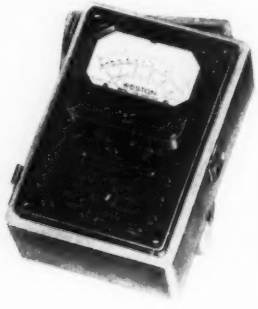


CSPB Transformers

THREE-PHASE, CSPB transformers are available which feature "loading by copper temperature" and integral surge protection, according to Westinghouse Electric Corp, Box 868, Pittsburgh, Pa. Designed for 4-wire, 208 Y/120-v secondaries, these units provide 3-phase banked-secondary operation without the possibility of cascading or reverting to radial operation, found previously when banking conventional transformers.

Transformers can be had in 75-kva rating in standard ratings from 2.4 to 14.4 kv inclusive.

•



Speech Circuit Analyzer

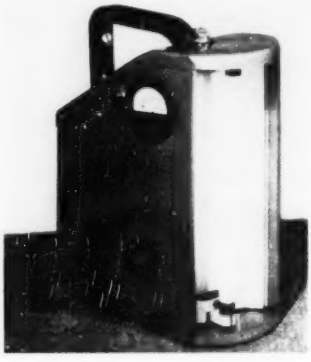
FOR TELEPHONE carrier current and transmissions line measurements, an analyzer for low level speech circuits has been designed by Weston Electrical Instrument Corp, 617 Frelinghuysen Ave, Newark 5, N. J. The instrument requires no power source connection and operates ungrounded.

According to the company, an unusually low range (−20 to +2 dbm) is provided by a rectifier circuit with broad frequency and temperature compensation. Complete a-c and d-c ranges to 1,000 v, direct current from 100 μa to 10 amp, and resistance ranges from 1,000 ohm to 10 megohm are also provided.

•

Emergency Floodlight

AN EMERGENCY safety floodlight that provides automatic lighting when normal power fails is produced by Lamplighter Corp of America, 89 Atlantic Ave, Brooklyn 2, N. Y. Known as Lamplighter Model M-660, the unit is



powered by two standard 45-v B batteries and is available for a-c or d-c operation.

Cover unlatches and swings open for replacement of fluorescent tube. Strength of batteries is indicated by operating switch alongside voltmeter. Floodlights are available in portable and permanent installation models.

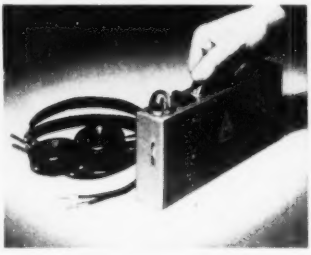
•

Suspension Clamps

MINIMIZED LINE LOSSES at clamping points are said to result through use of a line of Triple L suspension type clamps manufactured by The Porcelain Insulator Corp, Lima, N. Y.

Correct combination of metals—clamp bodies of either forged aluminum, cast aluminum-bronze, forged steel or malleable iron, together with non-magnetic U-bolts, keeper and cotter bolt—is given credit for reduction of hysteresis and eddy current losses. Four combinations are offered for suspending conductors ranging from 0.12 through 2.25 in. in diam.

•



Radioactivity Detector

FOR radioactive contamination surveys or prospecting for radioactive minerals, an instrument called the RCL Atomic Blinker is produced by Radiation Counter Laboratories, Inc, 1844 W. 21st St, Chicago T, Ill. It measures $1\frac{1}{2} \times 3\frac{3}{4} \times 9$ in. and weighs $2\frac{1}{2}$ lb.

Containing a Gieger-Mueller counter-tube, the device operates at 300 v from self-contained batteries. Ear phones or blinking light give indication of radioactivity.

•

Liquid Level Gage

FOR CONTROLLING or maintaining liquid levels in all kinds of vessels, both vented and pressure types to 250 psi, a liquid level gage and level control is manufactured by Rochester Mfg Co, Inc, Rochester 10, N. Y. Total contents of tank can be gaged, or level can be maintained to within a half-inch varia-

Introducing

AN ***ALL-NEW*** LINE OF

PINCO Triple "L" (LOW LINE-LOSS) CLAMPS

4

Combinations of Triple "L" Clamps for All Applications

1. **FORGED ALUMINUM**
2. **CAST ALUMINUM-BRONZE**
3. **FORGED STEEL**
4. **MALLEABLE IRON**

Available for conductors ranging from .12 inch through 2.25 inch diameter.

Prompt delivery on any one of four types listed above.

New Type Clamp Minimizes Line-Loss at Clamping Point

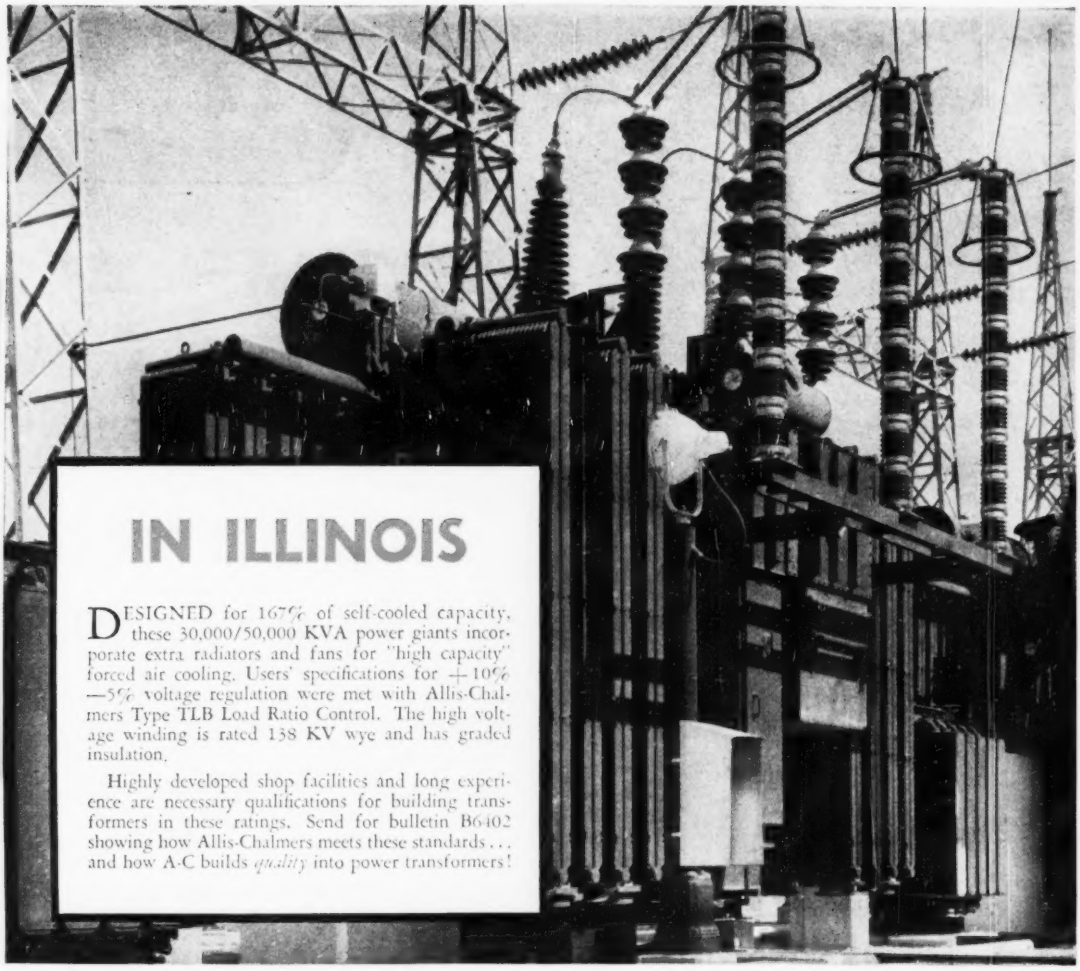
It is generally conceded that the high line-loss caused by clamps is directly traceable to hysteresis and eddy current loss . . . a condition which costs utilities thousands of dollars in power losses annually. Now, after five years of proven service on test lines, Pinco makes available a complete line of *low line-loss* clamps which reduce such line losses to a minimum. So, if you are concerned about line losses, it will pay you to investigate the new line of Pinco *Triple "L"* Clamps now! A telephone call, wire or letter will bring you complete information.

The Porcelain Insulator Corporation
761 Main St., Lima, N. Y.
Sales Agents: JOSLYN MFG. & SUPPLY CO. *Offices in Principal Cities.*

★ **PINCO INSULATORS** ★

Suspension Insulators . . . Switch and Bus Insulators . . . Distribution Clamps Distribution Pin Types and Guy Strains . . . Transmission Line Fittings . . . Tree Insulators . . . Transformer and Circuit Breaker Bushings . . . One Piece and Multi-part High Voltage Pin Types . . . Suspension and Strain Clamps . . . Indoor Bus Support Porcelain . . . Lightning Arrester Porcelain.

Power Transformers



IN ILLINOIS

DESIGNED for 167% of self-cooled capacity, these 30,000/50,000 KVA power giants incorporate extra radiators and fans for "high capacity" forced air cooling. Users' specifications for +10% —5% voltage regulation were met with Allis-Chalmers Type TLB Load Ratio Control. The high voltage winding is rated 138 KV wye and has graded insulation.

Highly developed shop facilities and long experience are necessary qualifications for building transformers in these ratings. Send for bulletin B6402 showing how Allis-Chalmers meets these standards . . . and how A-C builds *quality* into power transformers!

A-C ...means Quality Power Transformers

Circular coils withstand high stresses. Coils are rigidly braced, vacuum dried and treated.

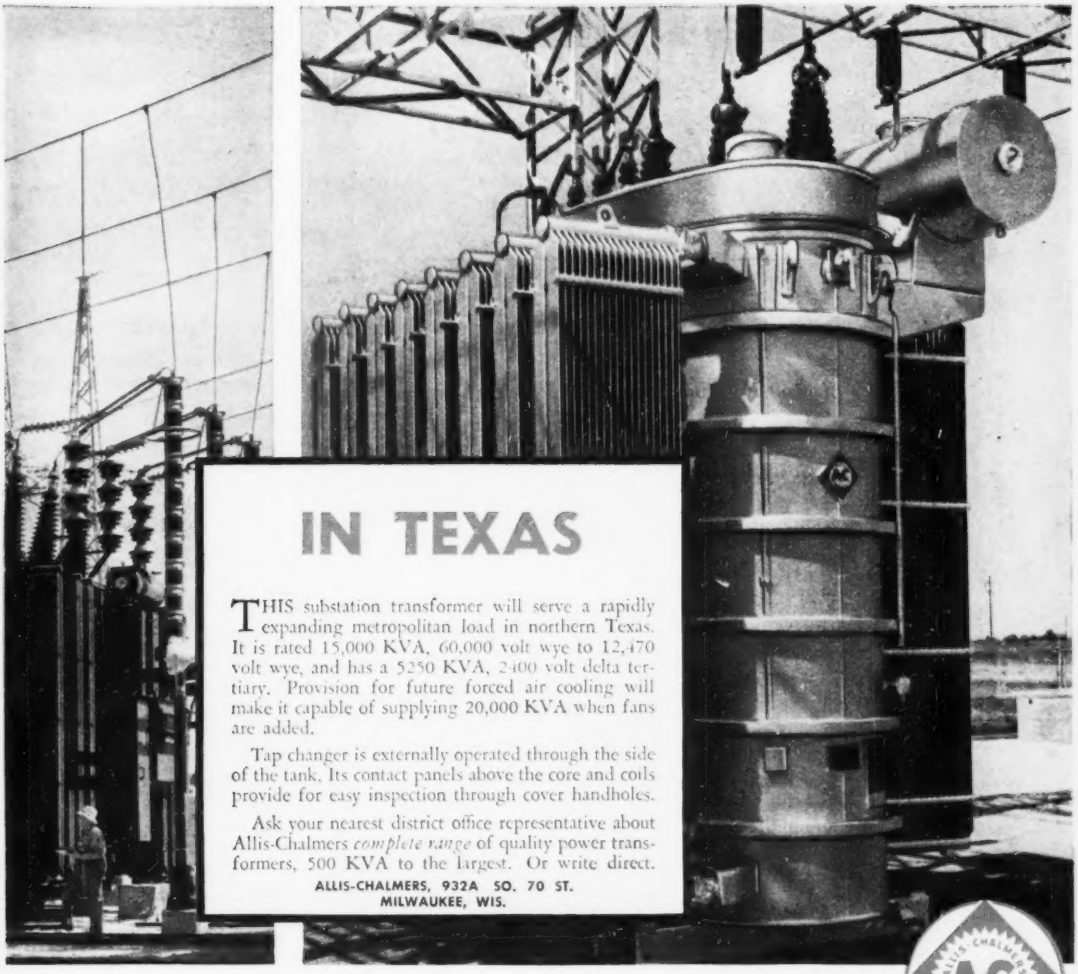
"Capacity Tailored" Load Ratio Control, featuring Allis-Chalmers 32-step regulation.

Controlled gasket compression insures correct pressure . . . increases life, effectiveness.

Strong, fin-type radiators rigidly braced. Staggered construction simplifies repainting.

Proved Oil-Sealed Inert Gas Protection provides simple, positive oil preservation.

"ON THE LINE!"



IN TEXAS

THIS substation transformer will serve a rapidly expanding metropolitan load in northern Texas. It is rated 15,000 KVA, 60,000 volt wye to 12,470 volt wye, and has a 5250 KVA, 2400 volt delta tertiary. Provision for future forced air cooling will make it capable of supplying 20,000 KVA when fans are added.

Tap changer is externally operated through the side of the tank. Its contact panels above the core and coils provide for easy inspection through cover handholes.

Ask your nearest district office representative about Allis-Chalmers *complete range* of quality power transformers, 500 KVA to the largest. Or write direct.

ALLIS-CHALMERS, 932A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

A 2622

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If you have a fabricating or processing problem involving paper . . . if you require definite technical characteristics and, above all, *dependable uniformity,* it may be worthwhile for you and MOSINEE technicians to get together. MOSINEE is not interested so much in terms of volume production as in our ability to render helpful service to manufacturers in the field of electronics and in the electrical goods industry. Our "paperologists" are at your service for consultation. Please write Dept. EW.

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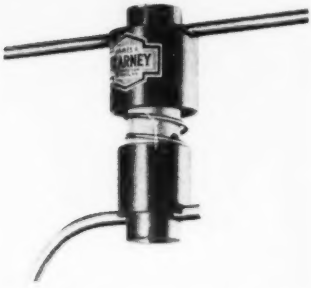
Essential Paper Manufacturers

tion by varying position of gage and length of float arm.

Two micro switches within gage and a 10-amp, heavy duty relay in box beneath operate single-phase pump motors up to 1 hp without additional contacts or starter. For larger or 3-phase installations, relay can actuate solenoid motor starter.

•



Secondary Fuse Cutout

RE-FUSING AND INSTALLING of Type A secondary fuse cutout is done quickly in three steps, so reports the manufacturer, James R. Kearney Corp, Dept FC-2, 4236 Clayton Ave, St. Louis 10, Mo.

Cutout consists of six permanently assembled parts of bakelite or stainless steel, that will not work loose or corrode. Light-reflecting glass-beaded yellow inner surface, automatically exposed, signals blown fuse. The unit handles up to No. 2 stranded or No. 1 solid copper wire, 100 amp, 250 v, which connects directly to silver-plated fuse terminals.

•

Switching Unit

GROUND CONTROL of pole-mounted, gang-operated, GE oil fuse cutouts of any rating is provided by a pole-base switching unit, announced by General

(*Continued on page* 161)

Graybar has 'em!

MORE STOCKS
to stretch pole-line dollars

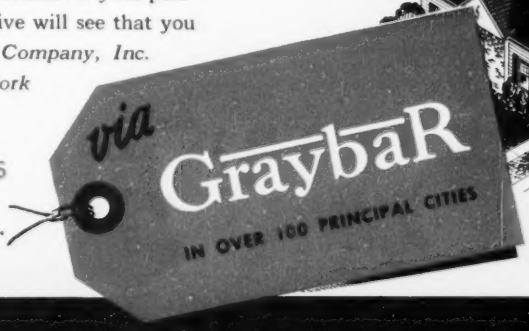
FOR MORE POWER
all along the line

Graybar has the pole-line supplies that can help you get the most from every budget dollar, *and here's why:* Every item has been chosen for sound construction and long life by men with exceptional outside construction experience.

Consider: (1) We distribute *everything* you need for pole-line construction and maintenance, so you can order everything for an entire project at one time through a single contact. (2) All our items are *field-proved products* of leading manufacturers. (3) Our long-time relations with these companies *facilitate procurement* of needed materials under all conditions. (4) Our nation-wide network of over 100 offices and warehouses affords *flexibility* of supplies-distribution, so you get all the things you need in the shortest possible time. (5) Our many years' *experience* in meeting the needs of power and light people gives us a helpful understanding of what you want. (6) The services of a near-by Graybar Outside Construction Specialist are always available to help you solve any pole-line problem.

Whenever you're planning a pole-line project, think of all those reasons for ordering supplies "via Graybar." Whatever your pole-line needs, your local Graybar Representative will see that you get them on schedule. *Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, New York.* 4952

SEE THE FOLLOWING PAGES
for information about some of the leading products distributed . . .

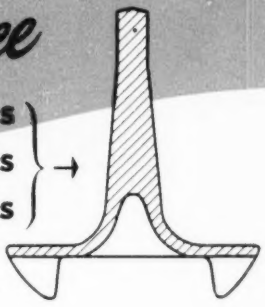


POLES • CROSSARMS • STRAND • INSULATORS • HARDWARE • CONNECTORS • LINE TRUCKS • PROTECTIVE DEVICES • TOOLS

HUBBARD FORGED STEEL CORNER PINS

One Piece

. . . no seams
. . . no joints
. . . no welds



Hubbard Drop Forged Corner Pins are made from a single piece of steel, forged to a broad base which completely covers the top of the arm. There are no seams, joints or pockets to retain moisture and hasten corrosion.

Due to the one piece construction, maximum strength is retained for the weight of metal used, and radio interference is minimized. Structural strength is also enhanced by the method of attachment, as the strap illustrated binds the wood fibres of the arm in such a way as to prevent splitting.

Hubbard and Company was the first to place this style pin on the market and it has been a popular choice for over twenty-two years. Furnished also with carriage bolts and a separate bottom strap to meet R.E.A. specifications.

HUBBARD AND COMPANY

PITTSBURGH
CHICAGO

OAKLAND
CALIFORNIA

via GraybaR

MORE STOCKS to stretch pole-line dollars

One Unit! One Order! One Responsibility!

That's How Easy . . . How Sure . . . it is when you use FWD's simple BUILT-TO-CODE Chart to select the Right FWD Truck for your Specific Needs

JUST imagine the time you save . . . the trouble you by-pass when you select a *built-to-code* unit for line construction or maintenance work with the help of FWD's handy code chart.

You quickly see the 38 varying — yet standardized — combinations that are available and the specific equipment each FWD carries.

You easily order the FWD you want because each unit is designated by an individual code number.

You issue only one order because FWD engineers and builds the *complete* unit — truck and equipment. That's why — when your FWD is delivered — it's ready to go to work immediately.

What's more — with FWD supplying the complete unit — buck-passing is eliminated. FWD accepts full responsibility.

Let FWD's code chart help simplify your equipment purchases. See your Graybar distributor or write us direct.

THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WISCONSIN
Canadian Factory: KITCHENER, ONTARIO

Built-to-Code

MOTORIZED UNITS

FOR LINE CONSTRUCTION AND MAINTENANCE

Built By

Makers of America's Foremost Heavy Duty Truck

Distributed by GRAYBAR

FOR MORE POWER all along the line

"We Save About $5,000 A Year By Protecting Solenoids On Track Operated Switches"

"The solenoids on our track operated switches draw about 10 amperes. Formerly we tried to protect them with 10 ampere fuses. The fuses, however, were too large to prevent burning out of the coils when fault currents below the rating of 10 amperes were applied, continuously.

"In 1943 we started to replace these fuses with 2 ampere Fusetron dual-element fuses. We found that the time-lag of the Fusetron fuses permitted them to hold the initial current surge yet they would open if the solenoid circuit failed to operate properly.

"Now we have all our solenoids protected with Fusetron fuses and have reduced solenoid failures about 90%. This reduction resolves itself in a saving of about $5,000 a year when all factors involved in a failure are considered.

"We have obtained better protection on "KL" relay circuits by replacing 300 and 400 ampere fuses with 200 ampere Fusetron fuses. We had many failures of "KL" relay coils, fusing and burning open, due to the larger renewable fuses. The 200 ampere Fusetron fuses hold the surge currents and protected the coil from fusing."

Ronald G. Thring, *Electrical Engineer*
Capital Transit Co., Washington, D. C.

With

Facts About FUSETRON Dual-Element FUSES

The fuse link element opens on short-circuit — the thermal cutout element protects on overloads — the result, a fuse with tremendous time-lag and much less electrical resistance.

They have the same degree of Underwriters' Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to the same dimensions as ordinary fuses — fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 ampere, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

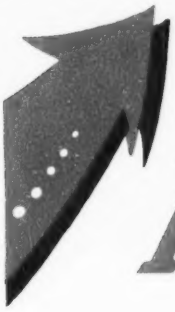
Their cost is surprisingly low.

(FUSETRON is a trade mark of the Bussmann Mfg. Co., Division of McGraw Electric Co.)

via Graybar

MORE STOCKS to stretch pole-line dollars

Fusetron DUAL-ELEMENT Fuses



with their

10 Point Protection

1. Protect against short-circuits.
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating — lesser resistance results in cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloading.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels.
10. Protect coils, transformers and solenoids against burnout.

Stop Wasting Time and Money —

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

FUSETRON Dual-Element Fuses Give ALL-PURPOSE PROTECTION

One needless shutdown — or one lost motor — or one destroyed switch or panel — may cost you far more than replacing every ordinary fuse with a FUSETRON dual-element fuse.

Don't risk such losses — protect yourself by installing a FUSETRON dual-element fuse in every set of fuse clips throughout the entire electrical system.

Bussmann Mfg. Co., University at Jefferson
St. Louis 7, Mo. (Division McGraw Electric Co.)

Please send me complete facts about FUSETRON dual-element Fuses.

Name _____

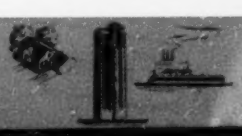
Title _____

Company _____

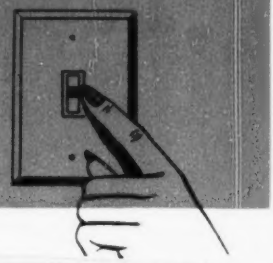
Address _____

City & Zone _____ *State* _____ 649

FOR MORE POWER all along the line



ELECTRIC HEAT
at the flip of a switch!



FOR PERIODIC HEATING
where heat is required for only an hour or two a day, or a day or two a week.

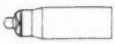
FOR TEMPORARY HEATING
in buildings where occupancy is temporary, to save high costs of installing ducts, pipes, registers, etc.

FOR ISOLATED BUILDINGS
remotely located from main heating plant, such as gatehouses, freight offices, suburban railway stations.

FOR AUTOMATIC HEATING
when a given temperature must be maintained without frequent attendance, as in outlying sub-stations.

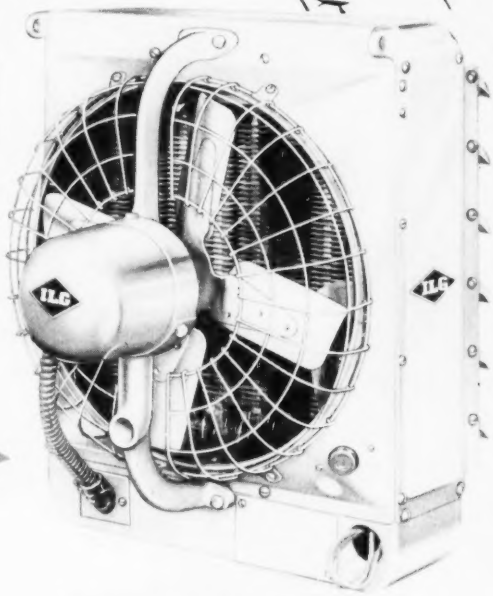
TO PREVENT FREEZING
or to keep temperature above a danger point, as in cold storage rooms for eggs, vegetables, fruits.

FOR AUXILIARY HEATING
where main source of heat is not adequate during cold waves, to avoid rebuilding antiquated heating system.



INFLAMMABLE SURROUNDINGS
where presence of fire is not permissable nor safe, in storage of gasoline, powder, etc. Coil heat held below 450°.

FOR DRYING PROCESSES
requiring heat and air movement on an automatic or semi-automatic basis, as in quick drying of X-Ray film.



Get NEW Bulletin

Colorful, new, 6-page bulletin No. 804 gives complete data on two fast-selling types of ILG *Electric* Unit Heaters. Popular capacities range from 1½ to 15 KW. Modern styling. Highest quality construction. Exclusive selling features. Units to help build load, well worthy of your recommendation and promotional backing. Get free bulletin today—write or phone nearby Branch Office (consult classified directory).

ILG REG U S PAT OFF

Electric UNIT HEATERS

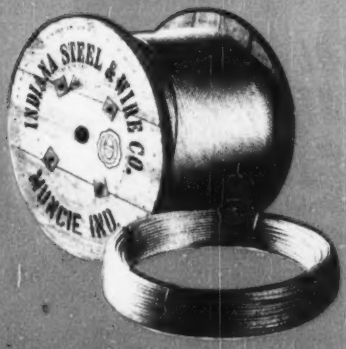
ILG ELECTRIC VENTILATING CO., 2885 N. Crawford Ave., Chicago, Ill. Offices in more than 40 principal Cities

via GraybaR

MORE STOCKS to stretch pole-line dollars

Crapo STEEL STRAND

Strength, Ruggedness and Durability at Low Cost



Plus Prompt Delivery

THE long life and low maintenance cost of *Crapo* Galvanized Steel Strand are matters of record with America's leading utilities.

The inherent strength of the steel in cross section is fully developed in each size and grade. The heavy, ductile, tightly-bonded zinc coating — applied by the famous *Crapo* Process — provides lasting protection, helps extend the life of the strand beyond the normal period of replacement.

There is a size and grade of *Crapo* Galvanized Steel Strand for every application — for guys, messenger and overhead static wires. Stocks are available for prompt shipment. Ask your Graybar representative for details!

INDIANA STEEL & WIRE COMPANY · MUNCIE, INDIANA

FOR MORE POWER all along the line

New Beauty Treatment for Commercial Interiors!

†LEADERALL

Illumination over all ...from wall to wall!

A CEILING OF LIGHT ...AT ANY HEIGHT!

The new look for high-ceilinged rooms . . . A magic means of bringing high ceilings down to modern levels . . . and, an economical means of "decorating" them, permanently, in the modern manner. (Leader tie-rods are adjustable and also are available in extreme lengths for long "drops.")

NEW FOR OLD!

Completely LEVEL • Absolutely RIGID
NO OTHER OVERALL-TYPE FIXTURE CAN MAKE THIS CLAIM

Only †LEADERALL brings you all these valuable features:

Reduces the cost of finishing new ceilings . . . Featherweight unit-frames . . . Translucent moulded plastic (fire-resistant) louvers permit many more apertures per foot for maximum "sifting" of lamp rays and greatest shielding of lamps (45° visual cut-off) . . . Insures highest quality of light for greater beauty and greater durability . . . Lightweight construction eliminates structural strains . . . Destaticized plastic louvers—dust-resistant, stay-white* plastic . . . Adjustable tie-rods . . . Units instantly removable for cleaning or for quick re-lamping . . . Complete rigidity—moulded units withstand rough handling by maintenance men.

Furnished, on special request, in colorfast hues for color schemes.

†PATENT APPLIED FOR

Light LIGHT... all in *white!

IN COLOR—IF YOU PREFER

The lightest weight over-all type fixture on the market, thanks to LEADER'S exclusive, one-piece *moulded translucent plastic louvers.* They are inflexible. Absolute uniformity, and more louvers per foot, achieving greater shielding of lamps, plus better diffusion of light, and no weight stress or strain on ceiling structure!

Leaderall LOUVERED LIGHT CEILING

A revolutionary application of fluorescent lighting—light by the square yard. An overall speedway of man-made sunbeams that speeds up worker efficiency. Calm, cool brilliance uninterrupted . . . A cheerful, May-morning sky throughout the year. Super-rich beauty, plus a new high in abundant light that's kind to eyes.

Send for mechanical details—today!

Leader Fluorescent Fixtures are sold and installed only by the better wholesalers and contractors.

LEADER ELECTRIC COMPANY

3500 N. KEDZIE AVENUE, CHICAGO 18, ILLINOIS

West Coast Factory: 2040 Livingston, Oakland 6, California

via Graybar

MORE STOCKS to stretch pole-line dollars

It Pays to Have the Right Equipment

Extension Ladders	Pike Poles	Spoons
Sectional Ladders	Pike Pole Guards	Reels
Diggers	Pole Supports	Tree Trimmers
Peavies	Tamping Bars	Warning Signs
Cant Hooks	Digging Bars	Folding Barricades
Carrying Hooks	Shovels	E-Z-Up Pole Cradle

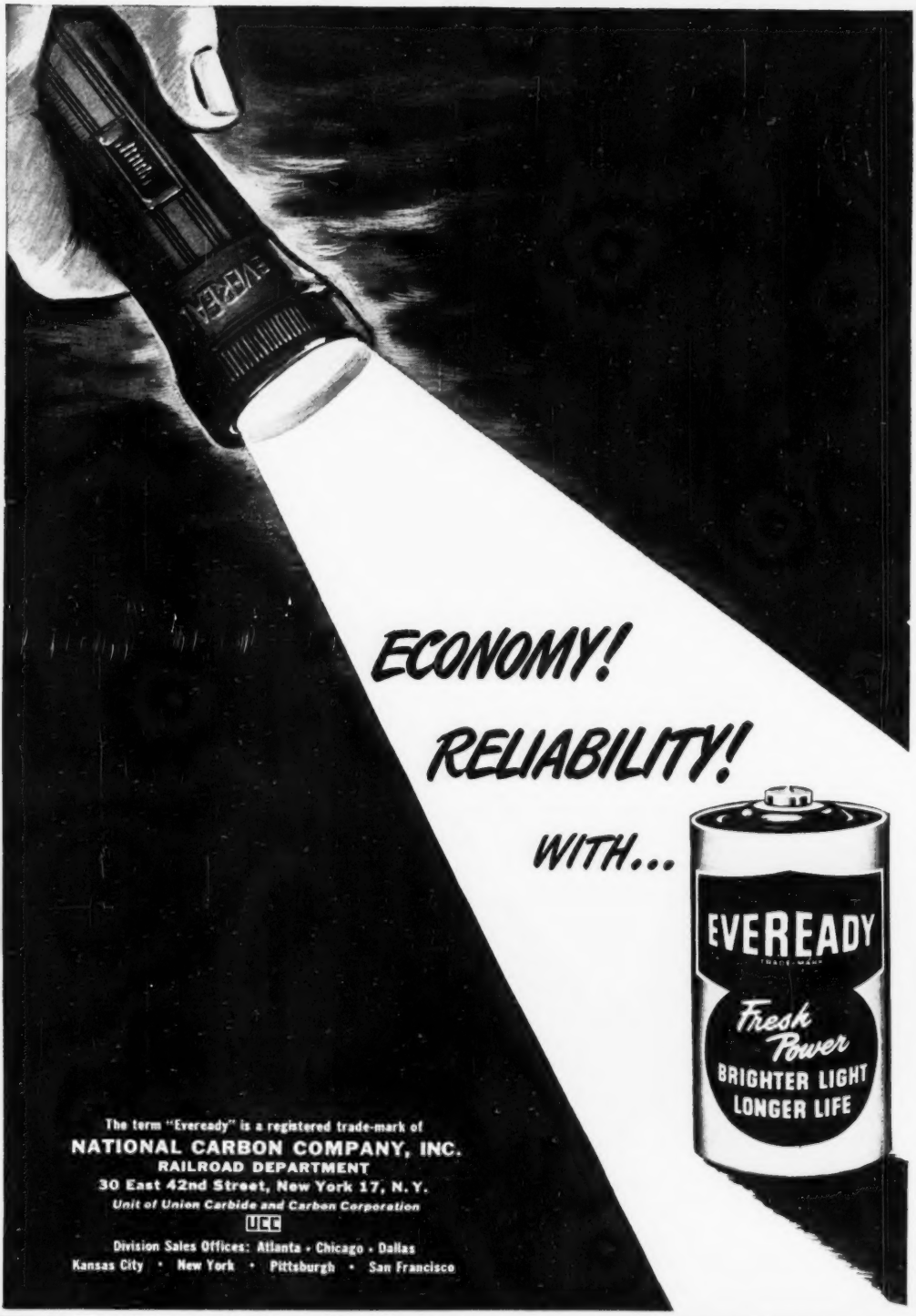
Write for full line catalog

OSHKOSH

POLE LINE TOOLS

LEACH COMPANY • Oshkosh, Wisconsin

FOR MORE POWER all along the line



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They go together

Nicopress TOOLS
Nicopress SLEEVES

Together they make the Perfect Splice

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

Nicopress is the Registered Trade Mark of The National Telephone Supply Company

FOR MORE POWER all along the line

3 WAYS TO MAKE SURE CABLES STAY PUT!

National Electrical Code paragraph 3014 specifies intervals at which cable supports must be used in vertical raceways.

When you're looking for a better way to hold cables fast, protect connections against pull or vibration—install O. Z. Cable Supports.

WHY?

BECAUSE O. Z. makes the *only* cable supports with one-piece impregnated maple plugs, machined to the exact wire size.

BECAUSE there is an O.Z. support for installation before or after pulling wire.

BECAUSE the serrated O. Z. liner provides a *positive* grip when plug is wedged home.

BECAUSE you can choose from three basic types the *best* support for your job—

1. **CONDUIT TYPE** for fast, easy installation on vertical runs. Screws directly on conduit. Malleable iron body grooved for tightening with screwdriver.
2. **LOCK TYPE** for use in *any* position. Threaded collar pressing against plug assures vibration-proof support under all conditions.
3. **SPLIT TYPE** for quick changeover jobs where cable is already installed. Body halves placed around cable, steel band fastened, and assembly placed on top of conduit.

There are thousands of O.Z. products designed to help you put power where you want it, and your O.Z. distributor is the man to see about them. Send for illustrated catalog.

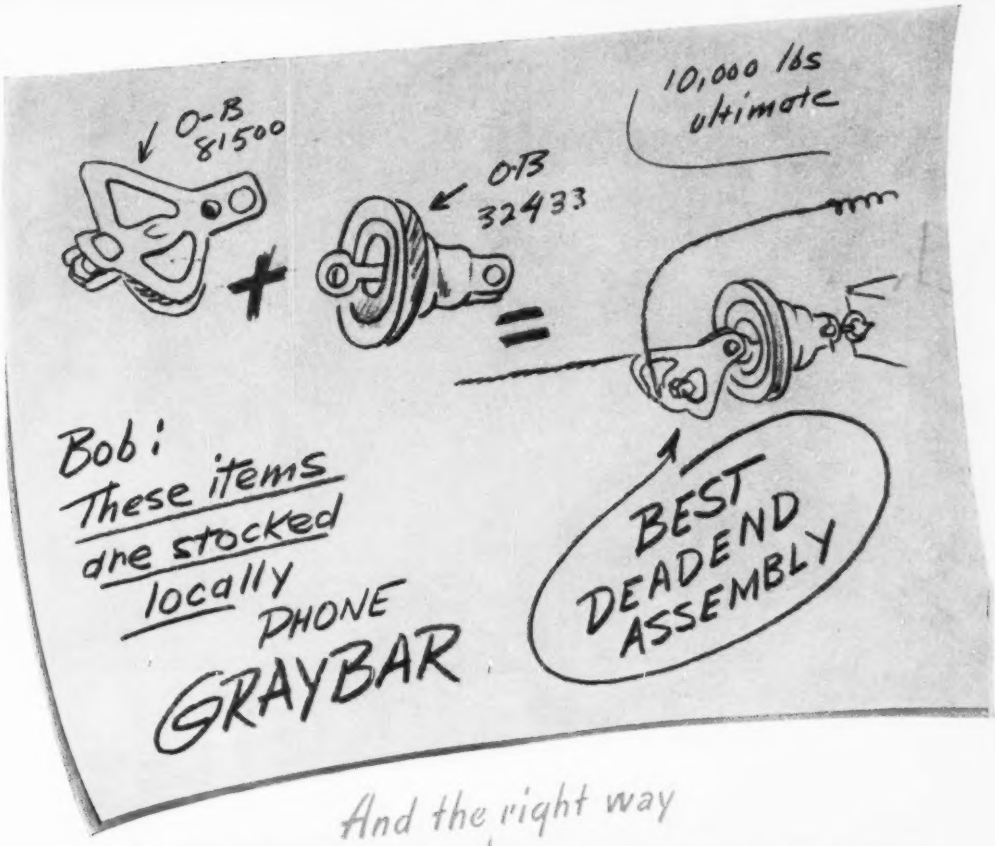
5305

And Remember—They're O. K. If They're O. Z.

CONDUIT FITTINGS • CABLE TERMINATORS • CAST IRON BOXES
GROUNDING DEVICES • SOLDERLESS CONNECTORS • POWER CONNECTORS

O.Z. ELECTRICAL MANUFACTURING COMPANY, INC.
262 BOND STREET • BROOKLYN 2, N. Y.

via Graybar **MORE STOCKS to stretch pole-line dollars**



And the right way

THE MODERN WAY TO BUILD DEADENDS

This O-B deadend make-up for urban and rural distribution circuits puts two kinds of strength where they are most needed.

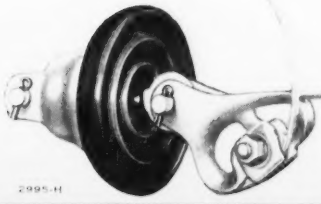
MECHANICALLY, the entire assembly has an ultimate strength of 10,000 pounds. Danger of dropping a conductor from failure of its deadend is most remote.

ELECTRICALLY, the assembly has a dry flashover value of 60,000 volts, wet flashover of 30,000 volts, $1\frac{1}{2} \times 40$ mu-s positive critical impulse rating of 100,000 volts. Leakage distance over insulation, 7 inches.

Both mechanically and electrically, this O-B deadend provides you ample safety factors at a point where real safety is urgent. In addition, the fine design and materials in its component parts keep maintenance costs low.

The same basic O-B quality found on the highest voltage transmission lines is in these materiols. This is the modern way, *and the right way*, to build your deadends.

Distributed by Graybar



2995-H

Ohio Brass

MANSFIELD, OHIO

FOR MORE POWER all along the line

A DEVICE FOR EVERY ELECTRICAL HAZARD

SALISBURY

RUBBER PROTECTIVE DEVICES

FOR LINEMEN AND OTHERS WHO WORK ON OR NEAR ENERGIZED EQUIPMENT. APPROVED BY SAFETY ENGINEERS FROM COAST TO COAST. • ADOPTED FOR SAFETY BY PUBLIC UTILITY COMPANIES EVERYWHERE. • DESIGNED FOR MAXIMUM DEPENDABILITY AND CONVENIENCE IN USE. • MADE FROM HIGHEST GRADE MATERIALS BY THE PIONEERS IN MANUFACTURE OF RUBBER PROTECTIVE EQUIPMENT FOR LINEMEN

Write for Catalog L-4

W. H. SALISBURY & CO.

GENERAL OFFICE AND FACTORY
401 NORTH MORGAN STREET, CHICAGO

via GraybaR

MORE STOCKS to stretch pole-line dollars

Only *Smithcraft* Eye-Q has

these outstanding *Selling* features

"IT'S SIMPLE TO INSTALL"
"IT'S SIMPLER TO CLEAN"
"LOUVERS HINGE FROM EITHER SIDE AND CAN BE COMPLETELY REMOVED"
"IT'S SAFE — NO GLASS OR PLASTIC PARTS TO BREAK"
"EXCEPTIONALLY HIGH EFFICIENCY - 83%. HIGH LIGHT OUTPUT WITH UNIFORM LOW BRIGHTNESS"
"YOU'RE RIGHT, AND LOOK AT THE SMART STYLING AND DESIGN"
"THOSE LO-BRITE LOUVERS MINIMIZE GLARE FOR COOL, COMFORTABLE LIGHT"
"EYE-Q IS UNBELIEVABLY LOW IN COST. YET CONFORMS TO THE HIGHEST CONSTRUCTION STANDARDS"
"YOU KNOW EYE-Q CAN BE MOUNTED IN ANY NUMBER OF WAYS"
"RIGHT, AND EITHER INDIVIDUALLY OR IN CONTINUOUS ROWS"

Eye-Q, for 2 40-watt lamps, combines every essential factor from economy to efficiency that must be an integral part of the right fixture for schools, stores, offices and buildings. It is one of many Smithcraft Fluorescent units designed to meet your lighting requirements.

Smithcraft
LIGHTING DIVISION
CHELSEA 50, MASSACHUSETTS

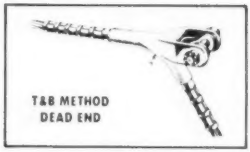
FOR MORE POWER all along the line

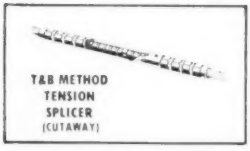
T&B ENGINEERED

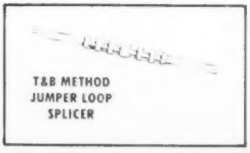
FEATURING AN ENTIRELY NEW AND COMPLETE LINE OF COMPRESSION FITTINGS FOR A. C. S. R.

T&B METHOD

RETURNS ENORMOUS SAVINGS IN INSTALLATION COSTS







- √ a dead-end, a tension splicer and jumper loop splicer
- √ easily and quickly installed by unique, *portable* tooling
- √ that can be used at *any height* on pole or tower
- √ making possible enormous savings in installation costs
- √ and cutting time and tedium usually required by job

FULL DETAILS AVAILABLE TO QUALIFIED APPLICANTS

THE THOMAS & BETTS CO.

INCORPORATED

ELIZABETH 1 **NEW JERSEY**

T&B PRODUCTS SOLD ONLY THROUGH THE T&B ELECTRICAL WHOLESALER

via Graybar **MORE STOCKS to stretch pole-line dollars**

Simplex double-acting Reel Jacks have sure-footed "T" shaped base.

No. 329 Pole Jack pulls or straightens any size pole.

No. 325 Pole Jack is used for poles up to 30 feet in height.

Simplex JACKS

No. 310-A—15-TON EMERGENCY JACK
Lifts vertically and lifts or pushes at any angle. Makes an excellent pole pulling and straightening jack where the amount of lift is not of primary importance. Lifts on the cap, two positions of the auxiliary shoe, the toe lift, and at any intermediate point by using a chain as a sling. Double lever socket provides for close quarter operation.

AERIAL CABLE AND WIRE TENSIONING JACK
Single Acting—Ratchet Releasing. Sufficiently powerful to pull up overhead and underground cables and to take up slack in trolley, guy and transport wires. Easy to set up. Weighs only 13 pounds.

MANHOLE SHEAVE
Extremely handy for pulling cable or carrying the winch line at right angles. Many other time-saving uses.

TRENCH BRACES
Their simplified drop-forged steel construction, and ball and socket joints at each end insure fast, efficient and economical bracing on all types of trench work.

HYDRAULIC JACKS
Rugged units for heavy duty service feature minimum closed height and maximum lift. Eight models with capacities from 3 to 100 tons.

Speed Utility Jobs

There's a wide variety of Simplex Jacks, specially engineered to save time, minimize operating effort, and provide maximum safety on all highly specialized utility operations. When you specify "Simplex" you are assured of maximum strength—minimum weight—simpified mechanism—full rated capacity through long service.

SIMPLEX REEL JACKS

Anything on spools, drums or reels can be paid out faster, safely and more productively with Simplex Reel Jacks. Right and left hand bases permit operators to lift in sight of each other for even jacking. Double acting type lifts or lowers on both upward and downward stroke of lever. Also Single-acting and Screw Type.

SIMPLEX POLE PULLING AND STRAIGHTENING JACKS

For pole work choose the Simplex No. 329, Single-acting, Ratchet-lowering jack. Adopted as standard by the Bell Telephone Systems, the No. 329 permits one or two men to pull or straighten any size of pole at any depth without digging and without interruption of service; also to pull butts or move loaded poles.

The Simplex No. 325 is suitable for poles up to 30 feet in height and is also efficient as a guy line tightener or for pulling underground cable.

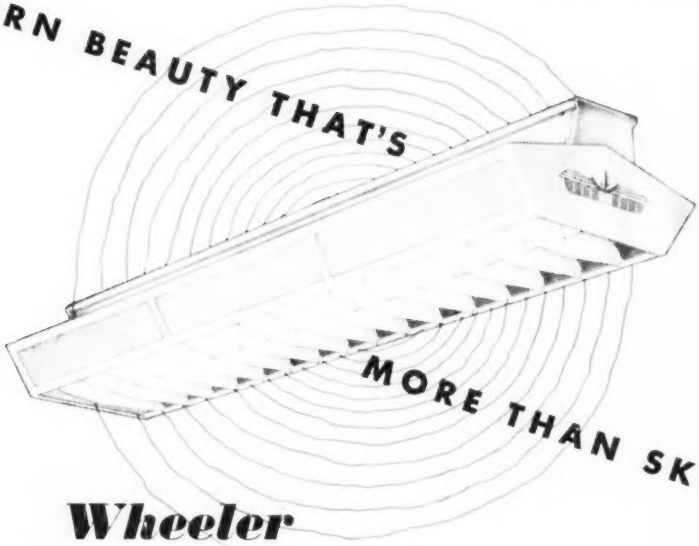
Write for Your FREE copy of Bulletin: Utilities 49 for complete specifications and prices on all Simplex Jacks for utility work.

Simplex
LEVER - SCREW - HYDRAULIC
Jacks

TEMPLETON, KENLY & CO., CHICAGO 44, ILLINOIS
1046 South Central Avenue

FOR MORE POWER all along the line

MODERN BEAUTY THAT'S



MORE THAN SKIN DEEP

Wheeler commercial turret* line

The extra value available in Wheeler "Skilled Lighting" shows up in the built-in beauty of Commercial Turret Line Fixtures. Next to good lighting comes good looks . . . and the longer they last, the sounder the investment for schools, hospitals, stores, office and public buildings.

Wheeler Commercial Turret Line Fixtures are designed to maintain acceptable low brightnesses at all normal viewing angles. Luminous glass side panels diffuse light in the line of vision.

These fixtures are designed for use with two 40-watt lamps, $3\frac{1}{2}$" spaced, unique demountable turret-type lampholders and detachable pivoted body construction. Lamp sockets slide back and forth on integrally formed channel tracks for easy installation and maintenance . . . then clamp in place. Fixtures are available for either surface-ceiling mounting or pendant stem suspension. Write for complete details.

Wheeler Reflector Company, 275 Congress St., Boston 10, Massachusetts.

Notice how the one-piece louver body swings open . . . from either side. Simplifies servicing.

Handy G. E. Turret* Lampholders provide spring tension that holds lamps securely. Lamps easily installed or removed without danger of breaking sockets.

OTHER SKILLED LIGHTING FIXTURES

There's a Wheeler Incandescent or Fluorescent Fixture to meet every industrial requirement.

Distributed exclusively through electrical wholesalers

Wheeler REFLECTORS

SKILLED LIGHTING

*Reg. U. S. Pat. Off.

MADE BY SPECIALISTS IN LIGHTING EQUIPMENT SINCE 1881

via GraybaR

MORE STOCKS to stretch pole-line dollars

(Model 931) PORTABLE TEST INSTRUMENTS combine dependability, ruggedness, compactness and readability. Exceptional shielding. Available in DC instruments; and companion instruments for AC, and as DC and single-phase AC wattmeters.

SENSITIVE RELAYS a line of sensitive relays including the Model 705 which provides positive control at levels as low as ⅓ microampere. Non-chattering magnetic contacts handle up to 10 watts at 120 volts.

(Model 622) ULTRA-SENSITIVE INSTRUMENTS portable DC and AC Thermo instruments for precision measurement of potentials and minute currents involving electronics, thermo-couples or laboratory research.

INSTRUMENTS

TO SPEED AND SIMPLIFY ELECTRONIC PRODUCTION AND MAINTENANCE

Illustrated are but a few of the many specialized instruments available from WESTON . . . all designed to simplify and speed-up electrical and electronic installations, production testing, and maintenance. For details, see your local representative, or write Weston Electrical Instrument Corporation, 578 Frelinghuysen Avenue, Newark 5, New Jersey.

WESTON *Instruments*

ALBANY • ATLANTA • BOSTON • BUFFALO • CHARLOTTE • CHICAGO
CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT • HOUSTON
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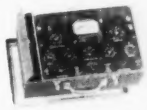
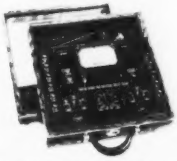
IN CANADA, NORTHERN ELECTRIC CO., LTD., POWERLITE DEVICES, LTD



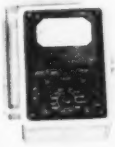
(Model 798) MULTI-PURPOSE TUBE-CHECKER offering provision for testing Receiving Tubes — Voltage Regulator Tubes—Light Duty Thyratron Tubes such as 2A4—6D4—884—885—2051. Scale is calibrated "Good-Bad" as well as in mutual conductance range.

PANEL and SWITCHBOARD INSTRUMENTS a complete line of instruments in all types, sizes and ranges required for switchboard and panel needs . . . including DC, AC power frequencies and radio frequency, rectifier types and D.B. meters.

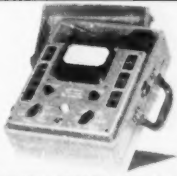
(Model 697) VOLT-OHM MILLIAMMETER one of a line of pocket-size meters, Model 697 combines a selection of AC and DC voltage, DC current, and resistance ranges. Ideal for maintenance testing and many inspection requirements.



(Model 785) INDUSTRIAL CIRCUIT TESTER a versatile, portable tester for laboratory or maintenance needs, where an ultra-sensitive instrument is required. Provides 27 AC and DC voltage, AC and DC current, and resistance ranges. (DC sensitivity 20,000 ohms per volt.)



(Model 779, Type 1) SUPER-SENSITIVE ANALYZER small, light, compact, 26 range Volt-Ohm-Milliammeter with 5 DC voltage ranges, sensitivity of 1000 or 20,000 ohms per volt. AC temperature compensated. Self-contained power supply. Ideal for many production and test requirements.



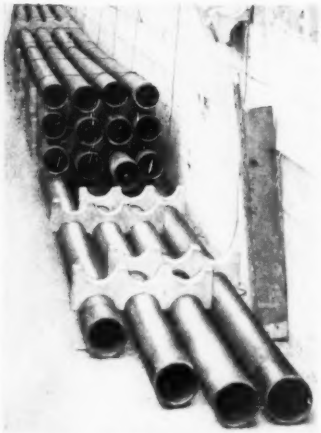
(Model 769) ELECTRONIC ANALYZER incorporating a conventional Volt-Ohm-Milliammeter with self-contained power source—a high-impedance electronic Volt-Ohmmeter using 115 volt, 60 cycle power—a stable, probe-type, Vacuum Tube Voltmeter, for use to 300 megacycles.

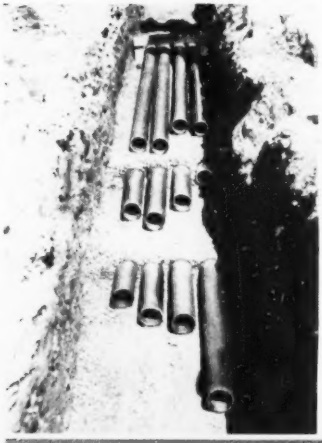
FOR MORE POWER all along the line

ORANGEBURG
FIBRE CONDUIT

STANDARD with concrete...NOCRETE without concrete...

America's Most Widely Used Conduit





* The *Electrical Industry* looks to dependable leadership to help safeguard its vast interests . . . to ORANGEBURG* CONDUIT, for example, for the *permanent protection* of cables underground.

ORANGEBURG CONDUIT'S smoother bore and low coefficient of friction gives cables this protection from . . . (1) *cable sheath abrasion* . . . (2) *strains due to pulling tension* . . . (3) *wear on sheath* from cable movement with changing loads.

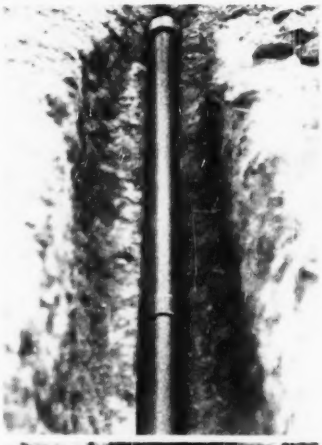
Electrical contractors and *builders* specify ORANGEBURG for smaller installations to protect electrical communications . . . for residences, garages and other buildings . . . for institutions, hospitals, colleges and public buildings . . . between buildings in industrial plants . . . for parkway lighting and signal systems.

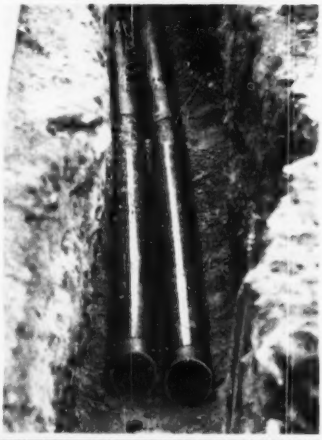
On the evidence of its 56 years underground, ORANGEBURG CONDUIT is made of materials that defy time, resist corrosive ground waters and chemical wastes *permanently*. *Other advantages* . . . easy to handle, transport, install . . . low initial and maintenance costs.

3 inch and 4 inch ORANGEBURG NOCRETE NOW AVAILABLE

For more complete data write ORANGEBURG today. Keep it for ready reference in your files.

ORANGEBURG MANUFACTURING CO., INC.
ORANGEBURG, NEW YORK





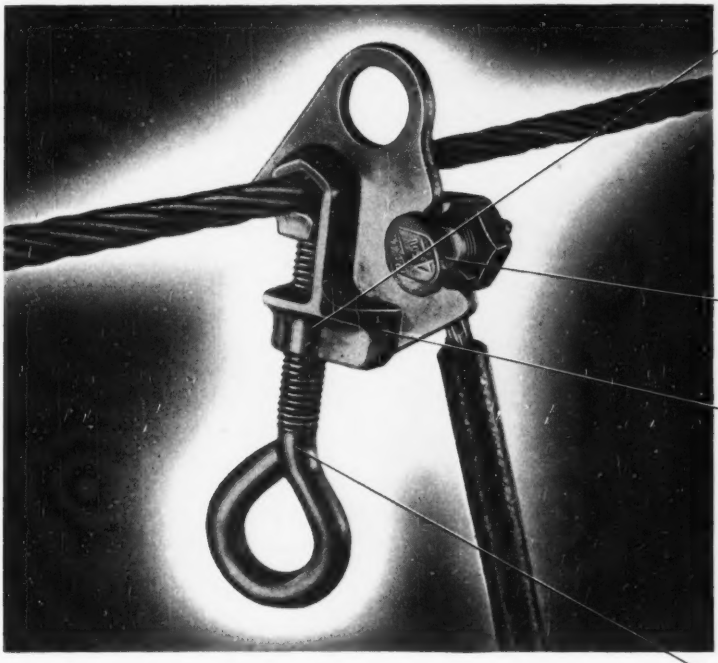
*Reg. U. S. Pat. Off.

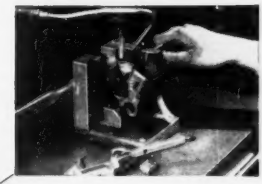
GraybaR ELECTRIC COMPANY **DISTRIBUTORS**

"FOR TOMORROW'S BETTERMENTS"

via GraybaR **MORE STOCKS to stretch pole-line dollars**

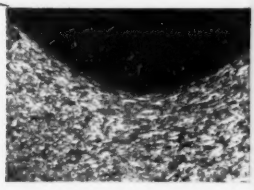
Accents on Accuracy





1. Bodies of accurate dimensions are located in fixtures which give perfect alignment for drilling and tapping.

2. The Reliable split bolt connector, with its many elements of accurate manufacture, makes a sure and efficient tap connection.



3. Grain structure of body is compressed to toughness and uniformity as seen in photomicrograph.

4. Silicon bronze eye screw has precision rolled thread and accurately centered point for perfect cooperation with contact.

in the manufacture of

HOT LINE CLAMPS

Reliable Hot Line Clamps of popular sizes are cold forged to give a tough and uniform grain structure — a world apart from porous castings. This means strength to make a good joint — one that will develop and maintain plenty of pressure. It means consistent strength — to make every joint develop this pressure And it means less weight to promote vibration fatigue, because the consistent high strength material makes extra bulk unnecessary.

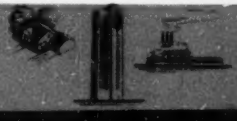
Reliable ELECTRIC COMPANY

3145 CARROLL AVENUE, CHICAGO 12, ILLINOIS

OVER 40 YEARS OF SERVICE TO THE UTILITIES

POWER-LINE CONNECTORS
AND
CONSTRUCTION SPECIALTIES

FOR MORE POWER all along the line



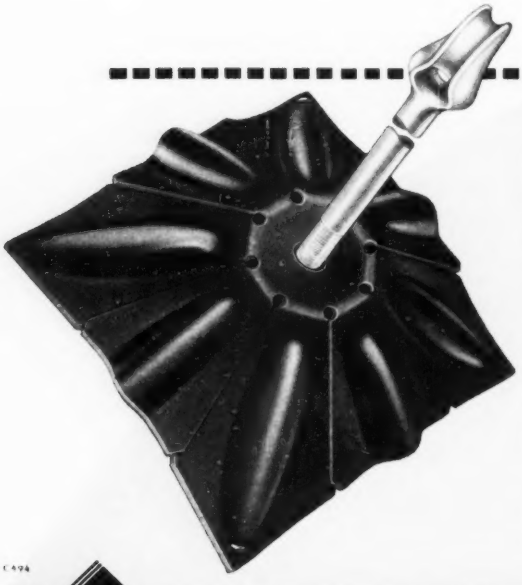
Chance Anchors

GET THE MOST FOR YOUR MONEY—SELECT ANCHORS FROM THE MOST COMPLETE LINE

Whatever your guying requirement may be, there's a Chance Anchor that will do the job most efficiently. The Anchors shown here are made in a wide variety of sizes. Each type is designed for certain soil and guying conditions. One of these Anchors will do a specific job better than any other anchor you can choose.

Standardization has advantages wherever it is practical, but remember that both the soil conditions and type are important factors in determining the type and kind of Anchors to use That's why Chance Anchors are made in so many different types and sizes. That's why it pays to analyze each job and specify the Chance Anchor that meets the requirements.

Only Chance and Chance-licensed Anchor Rods and Guying Fixtures have the improved full-rounded Thimbleye that gives complete guy strand protection at any angle. The full rounded groove fits snugly around the guy strand and prevents kinking, flattening or spreading after installation or during slack pulling operations.



CHANCE 8-WAY EXPANDING ANCHOR

The latest contribution to better anchoring, the Chance 8-Way, gives you more holding power for less money. Better load distribution makes this new anchor stronger than any other expanding anchor. There is no wasted area. The load is distributed evenly over 8 blades which expand to form a cone-shaped square Repeated pull-out tests demonstrate that the 8-Way develops more holding power and less creep than any other expanding anchor of comparable size under similar conditions, and that it retains its shape under extremely heavy loads.

Simplified construction makes the 8-Way easier to expand and more applicable to varied conditions. This simplicity also saves on manufacturing costs — a saving which is passed on to the user.

More than 13,000,000 Chance Anchors have been put in service—*more than all other makes combined.*

C494

ABC INDUSTRIES

You know it's RIGHT

A. B. CHANCE COMPANY—CENTRALIA, MO.;

via GraybaR

MORE STOCKS to stretch pole-line dollars

FOR EVERY GUYING NEED!

NEVER-CREEP ANCHOR
Made of structural steel. Pulls *entirely* against solid, undisturbed earth. For extra heavy loads in clay or loam.

NO-WRENCH SCREW ANCHOR
Sharpened steel blade double-welded to rod. Screws into ground with bar. For light loads in sandy soil, soft clay or loam.

WRENCH-TYPE SCREW ANCHOR
All steel—double arc welded. Anchor hub absorbs installation strain. For light loads in sandy soil, soft clay or loam.

PYRAMID CONE ANCHOR
Acts as inverted wedge. Flaring base and flat faces increase wedging action. Used in rocky areas with rock wedging.

EXPANDING ROCK ANCHOR
No grouting necessary. The greater the pull—the tighter it wedges against solid rock. Set in 2" drilled hole.

SWAMP SCREW ANCHOR
For swamps, marshes, quicksand, river crossings or seasonally flooded areas. Screws down deeply by adding sections of pipe.

4-WAY STEEL EXPANDING ANCHOR
For years the leading expanding anchor—all steel with reinforced expanding arms. Usually installed in clay or loam.

2-WAY STEEL EXPANDING ANCHOR
Same construction as 4-way—used for lighter loads. Blades expand in opposite directions balancing load.

EXPANDING POLE KEY ANCHOR
Keys poles at the butt to reinforce them against unbalanced loads in soft soil. Ideal for congested Urban areas.

PROTECT YOUR INVESTMENT IN LINE CONSTRUCTION

Get the most efficient anchoring for every condition by making anchor selections from the most complete line. Your Chance catalog will help you in making the right choice. Or write for your copy of "How Much Will an Anchor Hold?" It tells how to determine the type and kind of anchor to use for every guying condition.

when you specify...

A·B·CHANCE CO.
ELECTRICAL TRANSMISSION & DISTRIBUTION EQUIPMENT FOR CONSTRUCTION, MAINTENANCE & OPERATION

SAN FRANCISCO, CALIFORNIA

FOR MORE POWER all along the line

UTILITY LIFTING JOBS

MADE

QUICK

AND

EASY

WITH

DUFF-NORTON JACKS

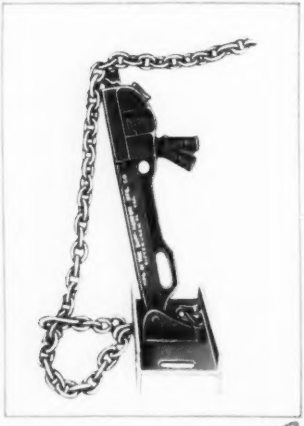
Duff-Norton Jacks save unlimited time, effort and money for light, power, street railway, railroad, telephone and telegraph companies, in maintenance of pipe lines, track, poles, bridges, heavy equipment, etc. There's a Duff-Norton Jack for every utility application. Write for data and proposal on these dependable jacks for your requirements.

CABLE REEL *Jacks*

Duff-Norton Cable Reel Jacks are standard with utility companies for lifting and holding heavy cable reels, because they meet the most exacting demands of utility crews under most adverse field conditions. Weatherproof, non-rocking, they provide rapid, even lifting and lowering.

Specifications				
Jack No.	Capacity Tons	Height Inches	Raise Inches	Weight Pounds
1030 CR	10	30	14	110

Other reel jacks are available with multiple hooks, for handling reels of varying diameters and weights.



POLE PULLING *Jacks*

Duff-Norton Pole Pulling Jacks pull or straighten utility poles without laborious digging. Hinged channel base permits jack operation at an angle or in upright position as required. "Service" need not be interrupted when these jacks are used.

Specifications					
Jack No.	Capacity Tons	Height Inches	Raise Inches	Base Inches	Weight Pounds
529	5	28	18	7x16	91
500	15	35½	23	10x24	250

These Duff-Norton Jacks

SAVE UTILITIES TIME • ENERGY • MONEY

- **TRENCH BRACES**
- **HYDRAULIC JACKS**
- **AUTOMATIC LOWERING JACKS**
- **PUSH AND PULL JACKS**
- **SCREW JACKS**
- **AIR MOTOR POWER JACKS**
- **MANY OTHERS THAT MEET EVERY UTILITY NEED**

• WRITE FOR CATALOG 203

DUFF-NORTON JACKS — ESTABLISHED 1883

THE DUFF-NORTON MANUFACTURING CO.

MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA.—CANADIAN PLANT, TORONTO, ONT.

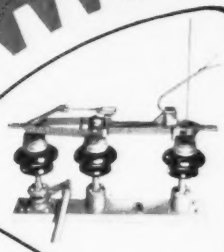
"The House that Jacks Built"

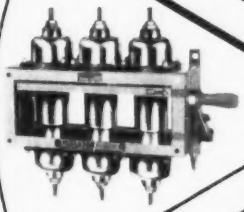
via GraybaR

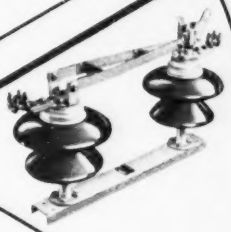
MORE STOCKS to stretch pole-line dollars

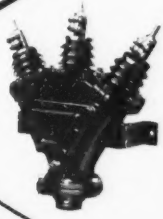
GEARED TO INDUSTRY'S NEEDS

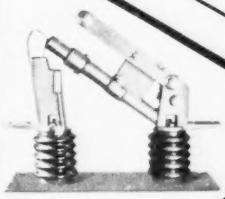
THREE "E's" POWER SWITCHING EQUIPMENT IS DESIGNED TO MEET DIVERSIFIED REQUIREMENTS









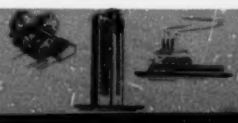


Air Break Switches
Bus Supports
Cable End Bells
Cable Isolators
Disconnecting Switches
Fused Disconnecting Switches

Fuse Mountings
Interrupter Switches
Isolators
Outdoor Substations
Power Connectors
Switchboard Structural Fittings

ELECTRICAL ENGINEERS EQUIPMENT CO.
MELROSE PARK, ILLINOIS

FOR MORE POWER all along the line



Made under carefully controlled conditions. Each lot of insulators is tested under methods set by American Institute of Electrical Engineers in Specifications No. H-1911 (ASA C-29-1941) and by the American Society for Testing Materials D730-43T. Inspection is conducted in accordance with Edison Electric Institute Specifications ED-51-1942.

Graybar supplies Hemingray Insulators

GRAYBAR is ready to fill your Hemingray Power Insulator requirements. Prompt shipment can be made on short notice.

Hemingray Insulators are manufactured under careful supervision from the finest materials. Constant inspection and exhaustive testing assure uniform excellence. Dependable performance in actual operation has made Hemingray the accepted standard in the industry.

Check with your nearest Graybar outlet for additional information and recommendations on filling your power insulator requirements.

HEMINGRAY
POWER INSULATORS

American Structural Products Company
MUNCIE, INDIANA

Subsidiary of **Owens-Illinois Glass Company**

via GraybaR **MORE STOCKS to stretch pole-line dollars**

WHEN TIME IS MONEY . . .

use COFFING HOISTS

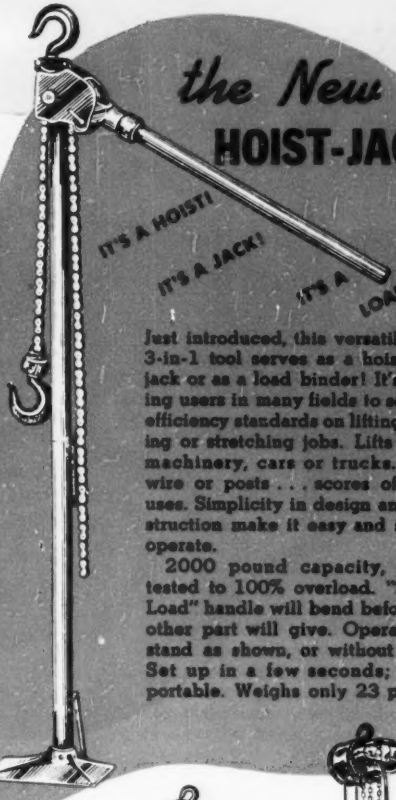
TO LIFT . . . TO PULL . . . TO STRETCH

Inadequate hoisting equipment overcharges you on the time sheet. With an efficient, easy-to-use and safe Coffing Hoist on the job you'll find yourself ahead time and again, in money and manpower. Check the complete Coffing line for the hoist you need.

the New "MIGHTY-MIDGET" PULLER

A mite for size but mighty in power is this new 6½ lb. puller that has a rated capacity of *500 pounds!* Maintenance and construction men like it because it's *light*, yet versatile enough to handle scores of lifting or pulling jobs . . . plus pulling wire and raising cable.

Two-way handle serves as a lever or high speed crank. Tested to 50% over capacity; equipped with "safety-load" handle that will bend before any other part of the puller will give.



the New HOIST-JACK

IT'S A HOIST! IT'S A JACK! IT'S A LOAD BINDER!

Just introduced, this versatile new 3-in-1 tool serves as a hoist, as a jack or as a load binder! It's helping users in many fields to set new efficiency standards on lifting, pulling or stretching jobs. Lifts heavy machinery, cars or trucks. Pulls wire or posts . . . scores of other uses. Simplicity in design and construction make it easy and safe to operate.

2000 pound capacity, safety tested to 100% overload. "Safety-Load" handle will bend before any other part will give. Operates on stand as shown, or without stand. Set up in a few seconds; easily portable. Weighs only 23 pounds.

"SAFETY-PULL" RATCHET LEVER HOISTS

The all-purpose hoists for every lifting job. Single or double locking pawl construction. Load is always under control. "Safety-load" handle of malleable iron will bend before any other part of hoist gives. Every model tested to 100% overload. Nine models available with capacities ranging from ¾ to 15 tons. Standard lift 5 feet; chain may be added for longer lift if required.

SPUR GEARED CHAIN HOISTS

Both top and load hooks are drop forged, heat-treated steel. Extra heavy malleable iron crosshead permits rocking motion of hoist, heavy suspension plates provide support between top hook crosshead and load sheave. Automatic load brake holds load securely at any desired position. Available in seven models to handle from ½ to 5 tons.

"QUIK-LIFT" ELECTRIC HOISTS

Uses only a few cents worth of AC or DC current per day. Each model equipped with heavy duty motor, single or three phase. High starting torque. Pendant rope control gives lifting or lowering accuracy to the fraction of an inch. Large braking surface. Top and bottom hooks of drop forged alloy steel. Load chain is of high grade steel, electric welded, factory tested. Hook or lug suspension. **Available in 17 models to handle from 500 to 4000 pounds at lifting speeds most suitable for your requirements.**

THE COMPLETE COFFING LINE ALSO INCLUDES

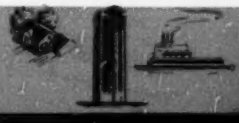
DIFFERENTIAL CHAIN HOISTS • I-BEAM TROLLEYS
UTILITY MAINTENANCE TOOLS

Illustrated bulletins available for these as well as all Coffing Hoists pictured on this page. Write:

COFFING HOIST COMPANY

DANVILLE • ILLINOIS

FOR MORE POWER all along the line



EVERSTICK ANCHORS

FOR TOUGH ANCHORING JOBS!

Today's anchoring jobs bring Eversticks to the forefront. They provide tight, safe anchoring . . . always in excess of rated capacities. Easy and quick to install . . . made of finest grade malleable iron with superior rust-resisting qualities and exceptional toughness. Every Everstick is plainly marked for ease of handling and storing.

The nut housing feature of the Everstick prevents rod from slipping thru while installing and provides a solid substantial base for the expanding blades.

There's a complete line of Eversticks for all strain requirements. 15 sizes of 2-way—3-way—4-way types.

EVERSTICK ANCHOR CO., Fairfield, Iowa

via GraybaR **MORE STOCKS to stretch pole-line dollars**

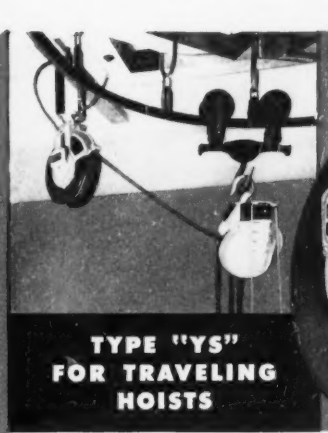
Positive Safety

FOR PLANT AND PERSONNEL

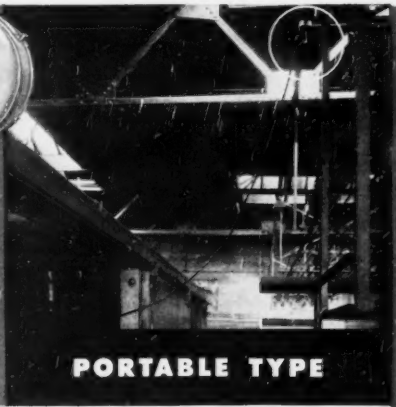
APPLETON REELITE

TRADE MARK

Automatically Takes Up, Pays Out Conductor Cable
Keeps Cord Reeled Up Safely Out of the Way



TYPE "YS" FOR TRAVELING HOISTS



PORTABLE TYPE

The Appleton Type "YS" Reelite for traveling hoists is built with a swivel base, permitting cord to be fed in any direction. Mounted at the mid-point, a Type "YS" Reelite equipped with 45 feet of cord will serve a stretch of track 90 feet long, straight or curved.

The Type "YS" Reelite eliminates the necessity for exposed current collectors, trolleys or wires. Outer cover easily removed to service brushes and power spring, or to make solderless line connections direct to terminal block. Oil-less bearings at all points of rotation.

RATING: 15 Amperes, 550 Volts A.C.; 250 Volts D.C.

The Appleton Portable Reelite takes light right where it's needed, in car-loading, stock-keeping, machine inspection, building maintenance—on hundreds of jobs that require bright, movable, safe illumination. Cord is paid out against spring tension and held to desired length by a ratchet stop. Works like a window shade. Cord is kept kinkless, tangle-free—safely out of the way when not in use, with never any excess underfoot. Helps avoid accidents, cuts cord maintainance costs to a minimum.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

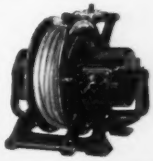
1703 Wellington Avenue • Chicago 13, Illinois

14 Branch Offices and 7 Resident Representatives in all Principal Markets

SEND TODAY for free copy of Bulletin 504. Fifty full pages describing Appleton Reelites shown here, plus special types and combinations for power tools, air and liquid lines. Or see Sweet's File, Page 2a 15

CONSTANT DUTY TYPE FOR HEAVY JOBS

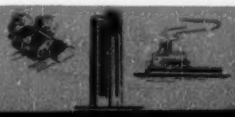
Carries smooth, uninterrupted power to moving electrical machines. Automatically winds up and pays out rubber covered cable to cranes, hoists, elevators, lifting magnets, generator sets—heavy mobile equipment of every kind. Pays for itself in efficiency, safety, cable protection.



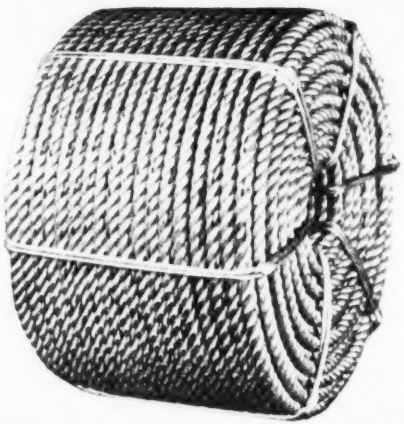
APPLETON

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

FOR MORE POWER all along the line



Uniform in construction and strength—long lasting and completely dependable—"AMERICAN BRAND" Pure Manila Rope is your best buy for winch lines, hand lines and other utility rope. It makes your pole line dollar go farther.



"American Brand"

PURE MANILA ROPE

AMERICAN MANUFACTURING COMPANY, BROOKLYN 22, N. Y.

ROPE • TWINE • OAKUM • PACKING

Branch Factories: ST. LOUIS CORDAGE MILLS, ST. LOUIS 4, MO. • DELAWARE RIVER JUTE MILLS, PHILADELPHIA 48, PA.

Sales Offices: BOSTON • CHICAGO • HOUSTON • NEW ORLEANS • PHILADELPHIA

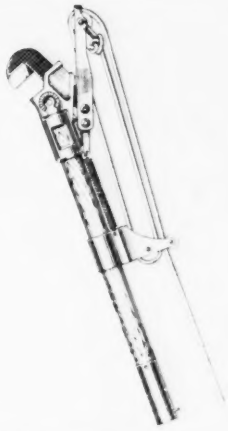
via GraybaR **MORE STOCKS to stretch pole-line dollars**

NEWMAN TOOLS
"tops with men who use them"

UNCONDITIONALLY GUARANTEED . . .

Letters from outstanding **SAFETY ENGINEERS** *testify to the value of* **NEWMAN TOOLS**

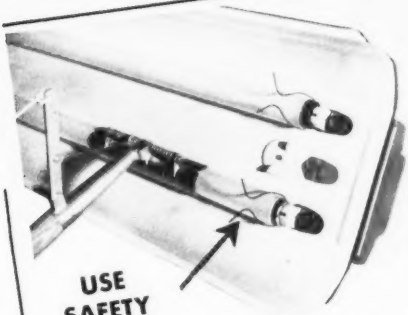
NEWMAN DOWNWARD CUT TREE TRIMMERS



This heavy duty trimmer makes full 1½" cut from top down rather than from bottom up . . . *with* gravity instead of against it. Cutting motion is cyclic — point first, then heel — until chrome steel blade cuts through last of bark. Easy, trouble-free action assured by Newman compound leverage, ball-bearing pulleys. Impossible to stick or wedge tool in limb.

Handles are 1½" diameter. Standard size 10' overall. Extensions in 5' sections.

Blade 3/16" high carbon chrome steel, heat treated, tensile strength 295,000 lbs. sq. in.



USE SAFETY CLIPS

With Newman Safety Clips, lamps can't fall out of sockets. Fit any standard socket. Only one second to install. Held by spring tension. Don't interfere with lamp changing. Once installed, leave in place, forget them.

NEWMAN SAFETY FLUORESCENT LAMP CHANGER

Reduce accidents. Save time, manpower. ELIMINATE LADDERS. Remove, replace fluorescent lamps in 10 seconds. Cordactuated spring automatically turns lamp 90° to release or insert, while lamp is held in jaws. Both Changes and Clip were designed by Jim Diver, long a Graybar man.

BUYING CHEAP MERCHANDISE TO SAVE MONEY IS LIKE STOPPING A CLOCK TO SAVE TIME

LONGRANGE SAFETY FOR HOT LINE CREWS

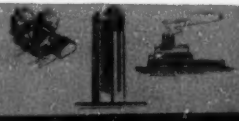
Cuts energized or cold lines by hot stick method. Easily operated at 30'. Tested at 75 kv per ft. Ideal for holding, leading, wrapping overhead lines in safety.

WE ALSO MANUFACTURE: LINE CLEARANCE TOOLS • POLE TREE SAWS • HAND TREE SAWS • HAND PRUNING TOOLS • HEDGE SHEARS • LOPPING SHEARS.

NEWMAN *Manufacturing* COMPANY, INC.

205-207 WESTPORT ROAD KANSAS CITY 2, MISSOURI, U.S.A.

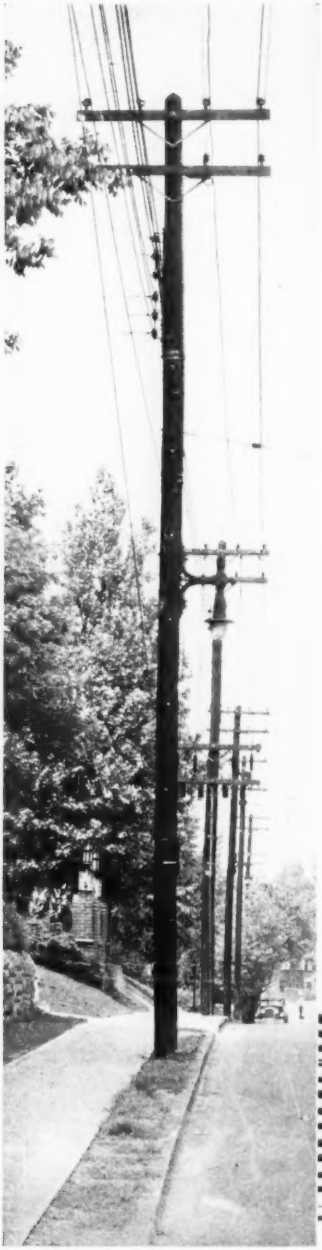
FOR MORE POWER all along the line



DEPENDABLE *Poles*

of

Selected Sound Timber Scientifically Treated



THE lasting strength of International Creosoted Pine Poles plus their low ultimate cost makes them the safest and most economical poles that can be purchased. For more than 70 years, numerous service records of pole treatments have been utilized to perfect the present production practices for International Creosoted Poles. As a result of the lessons learned during this long experience, International Creosoted Poles will assure trouble-free, continuous service. Their straight, clean, smooth surfaces perfectly adapt them for street lighting, rural and urban distribution.

International Creosoted Pine Poles are manufactured and distributed by two of the oldest companies serving the utility industry. They have grown up together, ready always to serve with quality poles, framed correctly, and shipped when needed.

Graybar Distributed by Graybar

INTERNATIONAL CREOSOTING & CONSTRUCTION CO.

PRODUCERS OF HIGH GRADE TREATED TIES, POLES, PILES, ETC.

Galveston — Beaumont — Texarkana

via Graybar **MORE STOCKS to stretch pole-line dollars**

MUTUAL ENDORSEMENT

- BARE WIRES AND CABLES
- OK® — PEERLESS® — TIP-TOP® WEATHERPROOF WIRES
- GUARDIAN® BUILDING WIRES AND CABLES — THERMOPLASTIC AND RUBBER INSULATED
- ROMEX® AND ROMEX-T. NON-METALLIC SHEATHED CABLES
- VARNISHED CAMBRIC POWER AND CONTROL CABLES, THERMOPLASTIC AND THERMOSETTING JACKETED, BRAIDED, OR LEAD SHEATHED
- ASBESTOS AND ASBESTOS VARNISHED CAMBRIC WIRES AND CABLES
- SUPER SERVICE S® AND OTHER PORTABLE CORDS AND CABLES
- MAGNET WIRE OF ALL TYPES

IN PROCUREMENT... Two fundamentals apply, always. 1. Pick yourself a reliable source of supply. 2. Specify a definite manufacturer's product, for quality's sake...This page displays two names to which you can pin your faith, under all circumstances. Everything you need is there — modern-specification insulation; quality-guaranteed construction; intelligent, cooperative service — "MORE POWER TO YOU".

GENERAL CABLE
CORPORATION

OFFICES IN PRINCIPAL CITIES

FOR MORE POWER all along the line

MODERNIZE

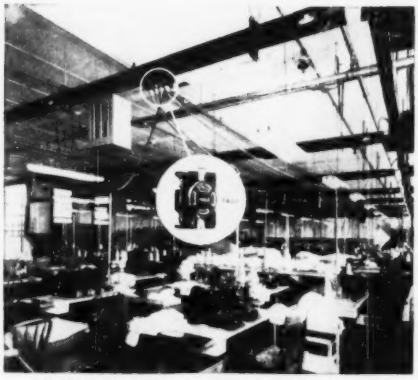
WITH

HUBBELL

Twist-Lock

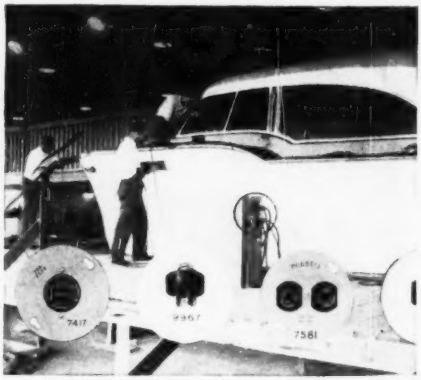
3-WIRE OR 4-WIRE
POLARIZED LOCKING CONNECTORS

• • •



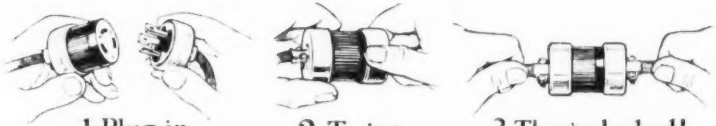
TWIST-LOCKS USED IN LARGE SHIRT FACTORY TO CONNECT SEWING MACHINES TO BUS-DUCT SYSTEM

Twist-Lock Connecting Devices are widely used by industries *wherever lockfast electrical connections are needed* to insure safe, uninterrupted production. Available grounded for safe operation.



USING 4-WIRE GROUNDED TWIST-LOCKS FOR HIGH CYCLE TOOLS AND 3-WIRE TWIST-LOCKS FOR SINGLE-PHASE TOOLS IN CABIN CRUISER PRODUCTION LINE

Twist-Lock Devices eliminate time-losses and annoying delays because they "stay put" — are vibration-proof — assure a lockfast electrical connection under all conditions.



1. Plug in– 2. Twist– 3. They're locked!

HARVEY HUBBELL, Inc. BRIDGEPORT, CONN.

via GraybaR **MORE STOCKS to stretch pole-line dollars**

Conduit installation Cost-Cutter...

Job time comes down, costs are cut sharply when you use a GREENLEE Hydraulic Bender. Accurate, smooth bends can be made by one man in but a few minutes in rigid conduit and pipe up to 4½", thin-wall conduit, tubing, and bus-bars. Many owners of GREENLEE Benders report time and labor savings of from 50% to 90% compared to previous methods of bending. Beyond this, the need for many manufactured bends and fittings is eliminated. As a result, this tool often pays for itself on the very first job. See your electrical distributor today for complete facts.

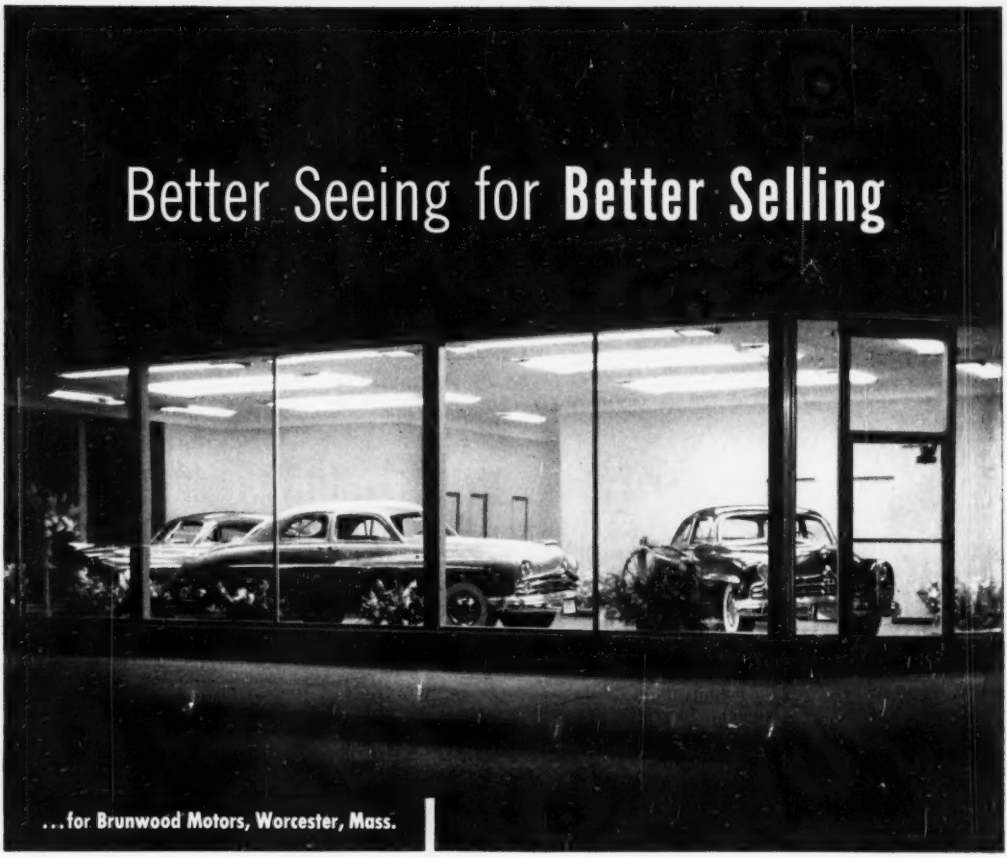
TOOLS FOR CRAFTSMEN

GREENLEE

ASK YOUR ELECTRICAL DISTRIBUTOR for information on GREENLEE Hydraulic Benders and these other time-saving tools: Hydraulic Pipe Pushers for pushing pipe under streets, railways, etc. • Hand Benders • Cable Pullers Knockout Punches and Cutters • Electricians' Auger Bits • Bit Extensions • Joist Borers • Spiral Screw Drivers • Automatic Push Drills • and many more. Greenlee Tool Co., Division of Greenlee Bros. & Co., 1806 Columbia Ave., Rockford, Illinois.

FOR MORE POWER all along the line

Better Seeing for **Better Selling**



...for Brunwood Motors, Worcester, Mass.

Sleek, graceful lines of these Lincoln cars are emphasized by the longitudinal reflections from Litecontrol fixtures that parallel all display windows. For extra accent, strategically placed lens boxes add sparkle and life to the chrome fittings.

Consulting Engineer: R. E. Lupien . Electrical Contractor: Coghlin Electric Company . Lighting Equipment: Litecontrol No. 9134 recessed lens fixture with 3 lamps and supplementary 250 watt accent lights . Lamps: 40 watt, 3500 degree, white, fluorescent; 250 watt incandescent . Wattage per Fixture: 150-fluorescent; 250-incandescent ; Total Wattage: 7,600 . Watts per Square Foot: 5.4 . Footcandles: 80 Initially.

Every one of the many Litecontrol fixtures are good to look at — graceful and glare-free. Yet they are capable of putting plenty of lighting punch on working or selling areas. Extra sturdy in construction — easy to install — Litecontrol fixtures are also built for faster cleaning and easier servicing.

Litecontrol engineers are specialists in building sales through better lighting. And they'll be glad to help you with advice — or by furnishing complete lighting layouts. With their technical assistance you can help your customers sell more goods — help yourself sell better lighting to more customers.

...with LITECONTROL FIXTURE NO. 9134

Selected for this automobile showroom was a Litecontrol flush, troffer-type unit using Holophane Controlescent curved lenses. Its optical engineering gives excellent light distribution and reduced contrast between fixture and ceiling. Smooth graceful lines and shallow recess depth blend pleasingly into any modern architectural design.

Cat. No.	No. of Lamps	HOUSING Length	Width	Height	TRIM Length	Width	Weight
9124	2-40W	48"	13¾"	5⅜"	49½"	14⅜"	46 lbs.
9134	3-40W	48"	13¾"	5⅜"	49½"	14¾"	51 lbs.

End Cap — No. 9100-3. Suspension Strap — No. 9100-6

LITECONTROL CORPORATION
38 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS

LITECONTROL *Fixtures*
KEEP UPKEEP DOWN

DESIGNERS, ENGINEERS AND MANUFACTURERS OF FLUORESCENT LIGHTING EQUIPMENT DISTRIBUTED ONLY THROUGH ACCREDITED WHOLESALERS

vrd GraybaR
MORE STOCKS to stretch pole-line dollars

YOU GET REAL VALUE

in

TRIANGLE

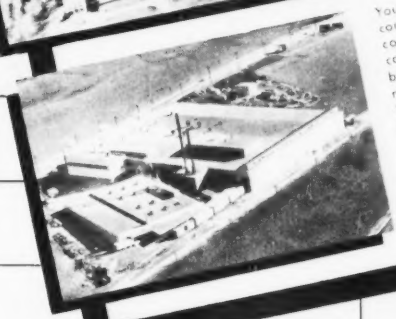
Conduit...Wire...Cable

Thanks to These

Up-to-the-Minute

PLANT FACILITIES

From wire bar to finished cable — all under one roof. Over 260,000 square feet of floor space in Triangle's modern New Brunswick plant permits integrated operations, undivided responsibility, for every step in the intricate process of making high performance wire and cable.



Your requirements for conduit, flexible steel conduit and armored cable are met faster, better, with Triangle's newly expanded plant in Moundsville, W. Va. Latest advancements in production equipment assure greater output and the uniformly high quality for which Triangle has been famous since 1916.

- BARE WIRE
- NEOPRENE LINE WIRE-WEATHERPROOF
- "TRIOSEAL" THERMOPLASTIC COVERED WIRE
- "GLAZON" BUILDING WIRE
- LEAD COVERED WIRE AND CABLE
- "GLAZON" "TRIEX" NON-METALLIC SHEATHED CABLE
- SERVICE ENTRANCE CABLE
- VARNISHED CAMBRIC CABLE
- "TRIOPRENE" TRENCH CABLE
- PARKWAY CABLE
- POWER CABLE
- SPECIAL CABLE
- "TRIOZONE" HIGH VOLTAGE CABLE

for Jobs that

MUST

BE

RIGHT,

Specify

TRIANGLE

"TRISTEEL" RIGID STEEL CONDUIT — HOT DIPPED GALVANIZED	THIN WALL CONDUIT — HOT DIPPED GALVANIZED	ARMORED CABLE—HOT DIPPED GALVANIZED	FLEXIBLE CONDUIT — HOT DIPPED GALVANIZED

For *Extra* quality — at NO Extra cost — *insist on* TRIANGLE!

If It Bears this Trade Mark ⚠ *It's Made by Triangle*

If It's Made by Triangle — IT MUST BE RIGHT!

ARTERIES FOR ELECTRICAL SYSTEMS — INCORPORATED

TRIANGLE CONDUIT & CABLE CO., INC.

1900 JERSEY AVENUE • NEW BRUNSWICK, N. J.

FACTORIES: New Brunswick, N. J. • Moundsville, W.Va.

IT MUST BE RIGHT !

"GLAZON" BUILDING WIRE • BARE WIRE • ARMORED CABLE • "GLAZON" TRIEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE, SERVICE DROP, VARNISHED CAMBRIC BRAIDED OR LEADED, TRIOPRENE TRENCH, POWER AND PARKWAY CABLES • RIGID CONDUIT HOT-DIPPED GALVANIZED • ELECTRIC METALLIC THIN WALL CONDUIT • FLEXIBLE STEEL CONDUIT

FOR MORE POWER all along the line

U.S. RUBBER COMPANY

Proudly Announces

The FIRST NEOPRENE-JACKETED SERVICE ENTRANCE CABLE

Accepted by UNDERWRITERS' LABORATORIES* and with Laytex® Insulation

You've never seen a service entrance cable like this! Neither had Underwriters' Laboratories. This great new U. S. Product answers the demand for a cable that will *not* festoon.

Underwriters' put the cable through a rough series of tests. Here are the results:

Dripping of compound at high temperatures: None.

Bending at low temperature: No damage sustained.

Flame Test: No burning of the paper indicator, nor any persistence of flame after last application of the test flame.

NOMINAL DIMENSIONS

SIZE	NEOP. JACKETED	STD. BRAID
3 6	.47 x .74	.56 x .86
2 6 & 1 8	.45 x .73	.55 x .85
3 8	.38 x .62	.50 x .76

Note smaller diameter of this new cable compared to diameter of standard braid.

High Current Test: Cable did not flame, rupture, nor warp excessively.

Di-electric strength: No electrical breakdown as a result of this test.

Conductor Pull-Out tests: Using three different connectors, the U. S. Cable *held three times better* than standard design cables.

Rough Handling at Low Temperatures: A coil of the cable was exposed for 5 hours to a temperature of minus 34.4 C. It was then dropped 8 feet to a concrete floor. No breaks or cracks in the Neoprene sheath occurred.

Abrasion: The outer covering of the U. S. Cable proved to be over 10 times more abrasion-resistant than that of conventional design.

Write today for information to Electrical Wire and Cable Department, United States Rubber Company, 1230 Avenue of the Americas, New York 20, N. Y.

* Underwriters' Laboratories, Inc. — For Service Not for Profit — Sponsored by National Board of Fire Underwriters — 207 East Ohio Street, Chicago

MADE ONLY BY

U.S.RUBBER — SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

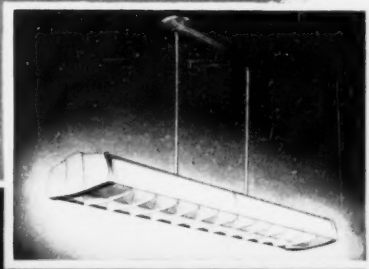
via GraybaR — MORE STOCKS to stretch pole-line dollars

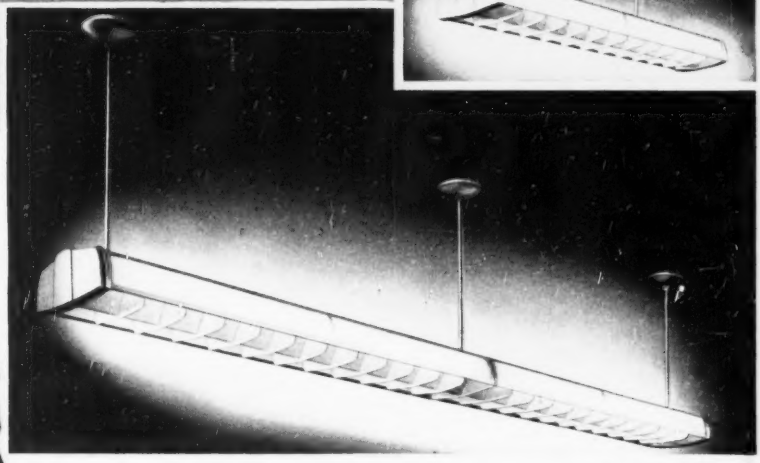
What's New and Different About The Wakefield GRENADIER II and IV?

A further standardization of parts applicable to both units has been achieved.

- **a** ***All units are now equipped with ETL approved Brick Type Ballasts.***
- **b** ***All units are now furnished with identical mounting devices.***
- **c** ***Six catalog numbers are eliminated without reducing the models or variety of mountings.***

Distributors may now maintain adequate service from stock with lower investments in inventories.





Grenadier II
in Stem, Canopy and On-Ceiling styles . . . using two 40W fluorescent lamps in each 4' section.

Grenadier IV
in Stem and On-Ceiling styles . . . using four 40W fluorescent lamps in each 4' section.

Distributed by Graybar

SEE YOUR GRAYBAR HOUSE

In classroom, office, drafting room and store installations the Wakefield Grenadier has earned respect for

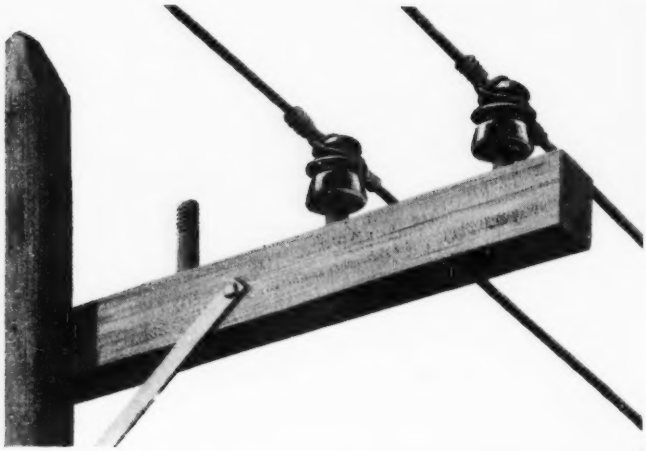
1. ***its ability to provide a highly efficient type of diffused lighting;***
2. ***design and construction features which make maintenance and part replacement simple and rapid, resulting in a "low cost of owning";***
3. ***the quality and beauty of its construction throughout and particularly of the metal-framed plastic side panels and the soft metallic satin finish of all metal parts.***

To these superiorities must now be added the new benefits of parts simplification noted above. Good news, we think, for all who stock, sell, specify and install the Wakefield Grenadier.

Wakefield Over-ALL Lighting

A BASIC CLASSROOM TOOL

FOR MORE POWER all along the line



THIS GLASS-INSULATED LINE COSTS LESS PER MILE

Savings do not affect insulating efficiency

Armstrong's Glass Insulators cut up to 40% off insulator costs on low and medium voltage distribution lines. At the same time, they meet or exceed E.E.I., A.S.T.M., and A.S.A. specifications for each type of service.

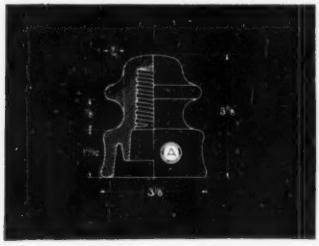
Each of the insulators diagrammed at the right have been designed to take full advantage of the special industrial glass from which they are molded. Both wall thickness and the location of grooves with respect to pinholes have been worked out to provide maximum mechanical strength in each class of insulator.

The inherent insulating qualities of glass have been improved through the development of formulations that make this material even more inert chemically. Thus Armstrong's Insulators today have a greater resistance to weathering, and this gives them higher resistance to surface leakage.

Armstrong's Glass Insulators are mass produced at low cost on completely automatic machinery. Every insulator gets the benefits of Armstrong's design and raw material improvements. Precise controls are maintained over all the steps in the manufacture of the insulators. And rigid inspection procedures insure only perfect insulators going out to you. For example, every insulator is gauged to make sure it fits the pin perfectly. Packaging assures delivery of insulators in good condition, too.

If you want to keep line costs down—and at the same time keep efficiency up, try the glass insulator that's stronger than the pin that supports it. Call your local distributor today for samples and prices of Armstrong's Glass Insulators for low and medium voltage distribution lines. You'll save—safely. Write to Armstrong Cork Company, Industrial Div., Millville, New Jersey.

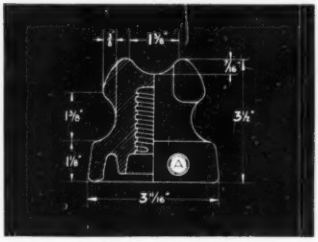
Your Graybar distributor has Armstrong's Insulators.



CATALOG NO. 51-C1

Made in Brown and Clear Glass

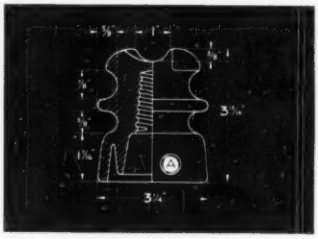
Edison Electric Institute Class	1
*Dry Flash-over—Volts	43,300
*Wet Flash-over—Volts	23,500
Average Mechanical Strength Lbs.	3,400



CATALOG NO. 51-1A

Made in Brown and Clear Glass

Edison Electric Institute Class	1A
*Dry Flash-over—Volts	50,000
*Wet Flash-over—Volts	26,000
Average Mechanical Strength Lbs.	2,500



CATALOG NO. 51-2U

Made in Brown and Clear Glass

Edison Electric Institute Class	2
*Dry 60 Cycle Flash-over—Volts	50,000
*Wet 60 Cycle Flash-over—Volts	23,000
Approx. Mechanical Strength Lbs.	2,500

* Test by Electrical Testing Lab., New York

ARMSTRONG'S GLASS INSULATORS

do the job for 40% less

via GraybaR **MORE STOCKS to stretch pole-line dollars**

85 YEARS OF *Experience* IN ALL-WOOD CROSSARM CONSTRUCTION

RAINIER—DOUGLAS FIR CROSSARMS

Thorough trial has proved properly selected and properly conditioned Douglas Fir Crossarms give long years of service. Production is accurately controlled to assure you a perfect product. Stocks are returning to normal and crossarms can be furnished from any of our conveniently located factories.

RAINIER—TREATED YELLOW PINE

Southern yellow Pine, properly treated, has become an accepted standard in some localities. Carefully controlled production assures a long lasting crossarm. Pressure treated arms can be shipped from either of two southern factories.

RAINIER WOOD BRACES—

The advantages of Rainier all wood construction are becoming increasingly important as maintenance labor costs rise. These highly satisfactory braces are offered in two types, each designed for easy installation with no right or left hand member. Shipment is promptly made from conveniently located factories.

RAINIER TRANSMISSION ARMS—

Again Rainier wood construction is recognized as ideal for a special purpose. Rainier Transmission Arm service includes the entire wooden crossarm components of any transmission line, this facility teamed with one of the leading line hardware producers, results in outstanding advantages to any utility.

OTHER PRODUCTS—

Wooden brackets, insulator pins and ground wire moulding are available for shipment from our various factories.

AMERICAN • CROSSARM AND CONDUIT COMPANY

RAINIER WOOD PRODUCTS TRADE MARK

General Offices
22 W. Monroe St., Chicago

Sales Offices
New York, N. Y. — Chehalis, Wash.
Kansas City, Mo. — Texarkana, Texas
San Francisco, Cal. — Jackson, Tenn.

Factories
Chehalis, Wash. — Kansas City, Mo.
Chicago, Ill. — Newark, N. J.
Texarkana, Texas
Minneapolis, Minn. — Jackson, Tenn.

RAINIER
ALL-WOOD CONSTRUCTION

FOR MORE POWER all along the line

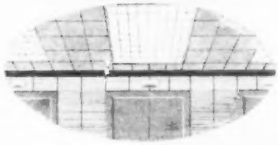
NEW! Day-Brite's FOUR-BY-FOUR unit

Incorporating the most advanced principles of integrated lighting . . . offering new architectural possibilities

FOR OFFICES

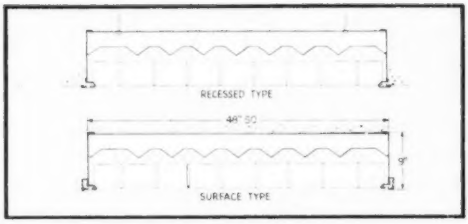
SMALL RETAIL STORES

LARGE DEPARTMENT STORES

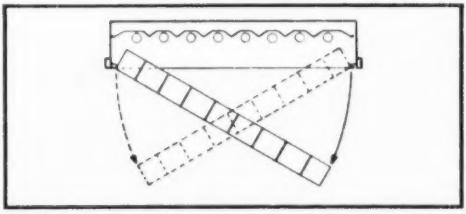


ENTRANCES, LOBBIES

Day-Brite's Four-by-Fours are engineered for both recessed and surface mounted applications. They can be used with 6, 8, and 10 40-watt fluorescent lamps. Knockouts are provided for feed connections. Plaster frames are available for use when fixtures are recessed.



Separable hinges on both sides of louvers allow hinging from either side for easy servicing. Exclusive Day-Brite BOXCO louver assembly has double-wall louvers interlocked for extreme strength and rigidity. Fixtures are rust-inhibited and finished in Hot-Bonded Super-White enamel throughout.



IT'S EASY TO SEE WHEN IT'S

DAY-BRITE *Lighting*

Write NOW for descriptive Bulletin 20-C

Day-Brite Lighting, Inc., 5425 Bulwer Avenue, St. Louis 7, Missouri

In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario

239

via GraybaR

MORE STOCKS to stretch pole-line dollars

SIMPLEX-ANHYDREX CABLES STAY ON THE JOB IN WET LOCATIONS

HERE'S PROOF

IN TEST FIGURES

Continuous testing to rigid standards proves without doubt that Anhydrex insulation will not absorb more than 20 mg. of water per square inch of exposed surface. Rarely does the figure climb that high. After one day's immersion in water at 70 C. (158 F.) Anhydrex has a dielectric constant that will not exceed 3.2. Its increase in capacitance between one and eight days' immersion at 70 C. will not exceed 3.5% for insulation thicknesses greater than 4 64", or 5% for thicknesses of 4 64" and less.

IN SERVICE RECORDS

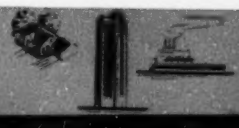
Reports from the field, which indicate that no ANYDREX Cable has ever failed due to water absorption, include this account: An eastern city known for its bad water conditions installed nearly 10,000 ft. of ANHYDREX Cable in its municipal signal and communications systems. During ten years' service the cables had no trouble whatsoever, although ducts and manholes there are nearly always full of water and metallic cables used in the same installations had proved inadequate. ANHYDREX Cable that was buried directly in the ground came through with the same trouble-free service, and portions of cables exposed above earth suffered no deterioration.

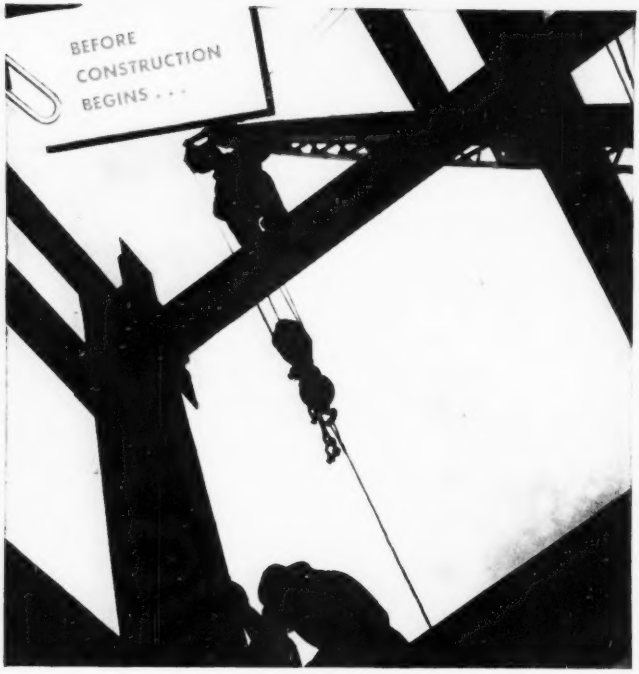
Neoprene-jacketed ANHYDREX Cables need no additional coverings. They cut down weight, diameter and cost. You can use them underground, overhead, or in ducts without fear of water and moisture, soil acids and alkalies, heat and weathering. Specify them with confidence for transmission and distribution systems, signal and communication circuits, street, airport and park lighting.

SIMPLEX-ANHYDREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

FOR MORE POWER all along the line





plan for operating savings in the long pull ahead

specify **DELTABESTON**®

While you're still in the budgeting stage—before your construction program gets under way—think beyond today's savings. Think in terms of real slashes in maintenance costs—for instance, the real, dollars-and-cents savings that go with Deltabeston wires and cables.

Asbestos-insulated Deltabeston wires and cables are made tough, to last long in tough jobs. Moisture, heat, flame, corrosive conditions—the operating hazards that keep knocking out ordinary wiring—call for Deltabeston, make it a must for continued, low-cost service.

So, why not specify Deltabeston wires and cables throughout—wherever heat and other severe operating conditions are a threat. You'll find it pays in the years ahead. For information on Deltabeston wires and cables, write to Section Y19-627, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC

HI-AMBIENTS

application hints from

GENERAL ELECTRIC

POWER CABLE—specify Deltabeston power cables wherever heat and other abusive conditions are a threat to operation. Use it for general power wiring for temperatures up to 110 C (230 F). Tough insulation and braid, or lead sheath, resist injury, heat, flame, moisture, corrosive vapors, and oil.

NEW SILICONE-TREATED CABLES—wherever extra-high heats are prevalent, use the new Deltabeston silicone-treated cables. Silicone-treated asbestos insulation resists temperatures up to 200 C (392 F). Silicone-treated glass braid gives these cables extra toughness, extra abrasion-resistance. For 300- and 600-volt service.

SWITCHBOARD WIRE AND BUS CABLE—your best bet for wiring switchboards when you want to keep maintenance costs down. Withstands temperatures up to 90 C (194 F). Insulated with felted asbestos and covered with cotton braid flameproof finish. Hinge cable available for swinging panel connections and general switchboard work.

MAGNET WIRE—Deltabeston magnet wire is available for extended motor life in all types and sizes—round, square, rectangular, in asbestos, glass, or silicone. Tough, small-diameter wires for easy winding and reduced motor maintenance. Specify Deltabeston magnet wire on all motor winding jobs.

*REG. U.S. PAT. OFF.

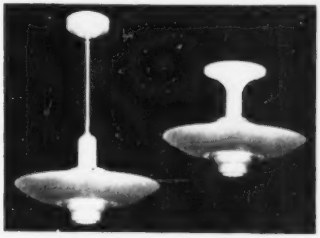
DELTABESTON
Wires and Cables
Built to beat the heat

via Graybar

MORE STOCKS to stretch pole-line dollars

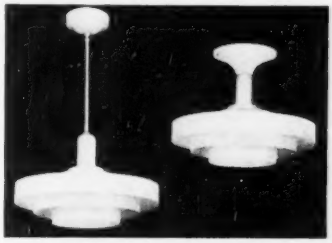
SILVRAY LUMINAIRES

Always specified when Good Lighting is important



707 707 C

INCANDESCENT



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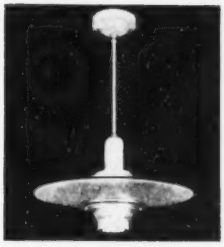


704

Silvray Silvered Bowl indirect lighting systems are the choice of lighting engineers. Softly diffused, glareless light suitable for classroom, office, drafting room or library is provided by any of several distinctive fixture designs executed in either metal or plastic.

The Silvered Bowl Lamp, basic element in Integrated Lighting, replaced through the bottom fixture opening, is the key to sustained high efficiency and low maintenance cost. In addition to Light for Seeing, a new group of Silvray Sales Lites provide Light for Selling. They are designed for use with the Semi-Silvered Bowl Lamp and provide an important down light to accent merchandise on display.

1101

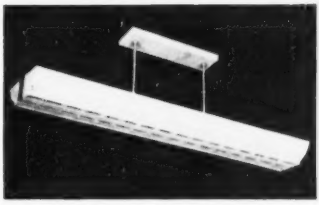
SIGHT SAVERS

2615

The home, too, can have softly diffused Silvered Bowl indirect lighting from Silvray Sight Savers. Available either in adaptor or permanently wired type, they provide the kind of lighting which banishes glare, and enhances home decoration. Easy to install, and low in price, Silvray Sight Savers add to the eye-comfort and eye-appeal of the home.

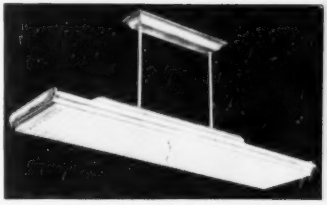
SS-2

FLUORESCENT



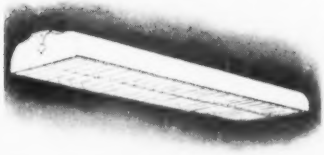
711

Silvray fluorescent lamp fixtures maintain the same high quality which has been established as the company standard for nearly a quarter-century. Functional, compact designs with graceful, flowing contours in all-metal construction are typical concepts of Silvray fixtures for two, three and four fluorescent lamps. Mechanical and electrical dependability, together with excellent illumination performance, mark Silvray fluorescent equipment among the best in commercial lighting.



604

Silvray fluorescent fixtures available in single or twin stem hangers—individual or continuous row installations.



333

NEW! THE SILVRAY #333

Designed specifically for those fluorescent lighting applications where price is important, but *not the only* consideration. 35° x 35° shielding 80% efficiency 45% upward, 55% downward distribution hinged and removable louver remote starter position sturdy all-metal construction suspension or ceiling mounting individual or continuous row installation single or twin stem hangers ballast and wiring compartment accessible from below certified ballasts and sockets—these are some of the features of the new Silvray #333.

SILVRAY LIGHTING, INC.

Executive Offices: RKO BUILDING, RADIO CITY, N. Y. Factory: BOUND BROOK, N.J.

FOR MORE POWER all along the line

For the supplies you need

call the nearest GraybaR office

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Sacramento
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COLORADO
Denver

CONNECTICUT
Hartford (West)
New Haven

DELAWARE
Wilmington

DISTRICT OF COLUMBIA
Washington

FLORIDA
Jacksonville
Miami
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IDAHO
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Roanoke

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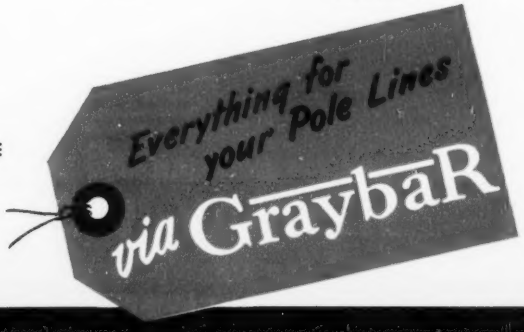
Spokane
Tacoma

WEST VIRGINIA
Charleston

WISCONSIN
Milwaukee



POLES • CROSSARMS • STRAND • INSULATORS • HARDWARE • CONNECTORS • LINE TRUCKS • PROTECTIVE DEVICES • TOOLS

(*Continued from page* 114)

Electric Co's Transformer and Allied Products Division, Schenectady 5, N. Y. It is available for either 2 or 3-phase installations.

Mounting on poles of any height is done by field adjustment of vertical operating member. "On" and "Off" positions are indicated at pole base by nameplates. Hand-operated lever may be padlocked in either position. Bulletin GEA 732 contains further information.

MORE NEW PRODUCTS
about which you should know

The Arrow-Hart & Hegeman Electric Co, Hartford 6, Conn., is offering without charge a kit of 47 **templates,** for motor control layout, which give exact dimensions of the company's starters, relays, transformers, terminal blocks and contactors (write to Rollin Peck, Adv. Mgr.). . . . W. H. Brady Co, Dept 32, 815 N. Third St, Milwaukee 3, Wis., announces self-adhesive positive-identification **pipe markers** called Quick-Labels which have names of materials in large black letters on correct ASA background colors; variety of gases, acids, waters and oils covered by 285 markers.

James A. Murphy & Co, Hamilton, Ohio, is now manufacturing the Paragon C compressed-air **separator** for removing oil, moisture and dirt from compressed air at the point of use, in two sizes—No. 1, inlet and outlet pipe size $\frac{1}{8}$ to $\frac{3}{8}$ in.; No. 2, inlet and outlet pipe size $\frac{1}{6}$ to $\frac{3}{4}$ in. . . . Reiner Electronics Co, Inc, 152 W. 25th St, New York 1, N. Y., has a long, slender **voltage probe** to extend by 100 the range of a vacuum tube voltmeter for measuring high voltages (30,000 v) of TV sets, X-ray equipment and other high voltage devices.

The R. W. Cramer Co, Inc, Centerbrook, Conn., has developed Type CF3 single or multi-contact **cycle timers** to automatically control a 1, 2, 3 or 4-circuit operation in a predetermined timing sequence; described in Bulletin No. 1520 . . . . Square D Co, Kollsman Instrument Div, 80-08 45th Ave, Elmhurst, N. Y., manufactures a 400-cycle, 115-v, 2-phase, 4-pole induction **servo motor** said to combine high torque, high speed, low inertia, small size and light weight.

Edwin L. Wiegand Co, 7513 Thomas Blvd, Pittsburgh 8, Pa., announced a new series of all-stainless steel or all-Inconel Chromalox electric **immersion heaters** for use in a wide range of viscous and corrosive liquids, in ratings from 1 to 15 kw at single-phase voltages of 230, 460, and 550-v. . . . Ingersoll-Rand Co, 11 Broadway, New York, N. Y., produces the Size 577 **air impact wrench** designed to handle large studs, bolts, nuts and cap screws from $1\frac{1}{4}$ to 2-in. thread size.

The Signet Development Co, 188 W. Randolph St, Chicago 1, Ill., has designed a **loudspeaker** said to be flame and explosion-proof . . . . Hopax Electric, Inc, 547 Greenwich St, New York 13, N. Y., manufactures a **receptacle plug,** in ratings up to 10 amp, that acts as a circuit breaker to guard against overloading, stalling or rotor locking on f-hp motor applications . . . . The Thompson Electric Co, 1101-14 Power Ave, Cleveland 14, Ohio, announced a line of spring-loaded **shock absorbers** for shockproof mounting of industrial lighting fixtures, meters, fans, motors, unit heaters, etc.

Lyon-Raymond Corp, 2017 Madison St, Greene, N. Y., has designed a **portable truck** with hydraulic lifting boom to handle delicate electrical instrument assemblies weighing up to 300 lb. . . . General Scientific Equipment Co, 2700 W. Huntingdon St, Philadelphia 32, Pa., has available the fountain-pen size G-S **magnetic probe** with retractable tip for removing ferrous particles from electrical instruments, delicate mechanisms and the human body . . . . Keystone Mfg Co, 23328 Sherwood Rd, Center Line, Mich., makes a **flangeless wireway** with knockouts every 3 in.; available sizes are 4x4 in. and 6x6 in. in 1, 2, 3 and 4-ft lengths.

Syracuse Alloy Metals Corp, 116 S. Salina St, Syracuse 2, N. Y., has announced a line of **cylinder carriers** for welding service which can be maneuvered in confined passages and have lock bar for holding cylinders in tandem . . . . Square D Co, 4041 N. Richards St, Milwaukee 12, Wis., has a d-c **pneumatic timer** (Class 9050) with timing range adjustable from 0.2 sec to 3 min; described in Bulletin 9050 . . . . The Connecticut Plastilight Corp, 481 Canal St, Stamford, Conn., has developed a lightweight, fireproof, **plastic lampshade** for interior and exterior lighting installations, on which colored drawings or advertising may be applied.

The American Brass Co, Waterbury, Conn., produces a moisture and oil tight, electrical **wiring conduit** called Sealtite, which consists of flexible, galvanized steel tubing covered with a smooth, abrasion-resistant, plastic jacket in sizes $\frac{3}{8}$ to 2 in. . . . Manco Mfg Co, Bradley, Ill., has designed a Special Center Cut **bolt cutter** for cutting case hardened bolts, chain or reinforcing rod up to 7/16 in. (solid rod)

Silicone News

DC SILICONES

Silicones Pay Off In a Buyer's Market

Your customers are demanding more for their money. Offer them better performance, longer life, greater reliability or reduced maintenance costs and they'll listen. Design all four of those basic sales appeals into your product and they'll buy. You can do that in many cases by taking advantage of the exceptional stability of Dow Corning Silicones.

For example, you can give your customers permanent lubrication by using DC 44 Silicone Grease. DC 200 Silicone Fluids enable you to design more compact hydraulic systems or make wider use of viscous damping. You can increase the power per pound ratio in electric machines by 50 to 100 per cent and you can increase the life of electrical equipment by a factor of 10 through use of Dow Corning Silicone—Class "H"—Electrical Insulation.

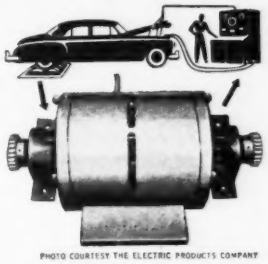


PHOTO COURTESY THE ELECTRIC PRODUCTS COMPANY

DC Silicone Electrical Insulation and DC 44 Silicone Grease improve the performance, cut maintenance and increase the life of E. P. Electric Chassis Dynamometers.

Typical application for Dow Corning Silicone Electrical Insulation is the Electric Chassis Dynamometer made by The Electric Products Company of Cleveland. Complete performance testing of automobile engines without actual road tests makes it necessary for the armature coils to absorb so much energy that operating temperatures are in the range of 400° F. Under such severe conditions, only Silicone Insulation and DC 44 Grease give long and trouble-free service.

Among many other applications, Silicone Insulation is used in building compact, high powered solenoids; portable welding transformers; bus generators and industrial motors. For more information about Dow Corning Silicone Electrical Insulation, write for pamphlet G11AB6.

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FIRST IN SILICONES

NEWS ABOUT PEOPLE

Erwin Elected President of Central Ohio Utility

Announcement has been made of the election of Floyd W. Woodcock as chairman of the board of the Central Ohio Light & Power Co, Findlay, and of Emory D. Erwin as the new president to succeed Mr Woodcock. Louis J.

EMORY D. ERWIN

Wissler and Paul D. Martinka were elected vice-presidents.

Mr Woodcock had been president since the utility was organized in 1929. Early in his career, as vice-president of Day & Zimmermann, Mr Woodcock was in charge of public utility proper-

PAUL D. MARTINKA

ties under their management for a number of years. Later he became president of the Empire Public Service Corp formed in 1928 as a holding company controlling properties in Maryland, Ohio, Kansas, Louisiana, Oklahoma, Texas, and Colorado. Subsequently he was selected to head Central Ohio Light & Power.

LOUIS J. WISSLER

Mr Erwin, the new president, has been serving as vice-president and general manager. He first joined Central Ohio Light & Power in 1937 as new business manager. After spending four years as assistant general manager of Colorado Central Power Co, Englewood, Colo., he returned to Central Ohio Light & Power in 1943 as assistant general manager. His promotion first to general manager and then vice-president and general manager followed. His early utility experience was obtained with the Virginia East Coast Utilities, the Northwest Carolina Utilities, and the East Coast Telephones, Inc.

Mr Wissler is head of the company's eastern division with offices in Wooster, and Mr Martinka is superintendent of production with headquarters in Findlay.

•

Westinghouse Elects Two New Vice-Presidents

Two vice-presidents were elected by the Westinghouse Electric Corp at a meeting of the board of directors held last week. James H. Jewell and John M. McKibbin, who joined the company in 1920 and 1922, respectively.

Mr Jewell has been manager of the apparatus sales division since 1947; Mr McKibbin has been advertising and sales promotion manager of the company since 1945.

Warren Appointed Manager of GE Turbine Divisions

Glenn B. Warren has been appointed manager of General Electric Co's turbine divisions, succeeding John W. Belanger, who recently was named assistant general manager of the apparatus department. Edwin E. Parker has been made manager of engineering of the turbine divisions to succeed Mr Warren, who has held this position since 1947. Nicholas M. DuChemin, manager of the company's meter and instrument divisions at Lynn Mass., has also been appointed assistant general manager of the apparatus department.

Mr Warren joined GE in 1918, and, following a period as a student engi-

GLENN B. WARREN

neer on the GE test course, he spent several years in charge of turbine design and research in the turbine engineering department. In 1931 he was made designing engineer of this department and was directly responsible for the design of large steam turbines for public utilities from that time until 1947. During World War II, Mr Warren had general design supervision in development of GE aircraft gas turbines, as carried out in the Schenectady Works. In 1944 Mr Warren was given design responsibility for generators as well as turbines on turbine-generator sets. Three years later he was named manager of engineering for all turbine, turbine-generator, and gear divisions of the company, exclusive of gas turbines for aircraft use.

Mr Parker joined GE as a student engineer on the test course. In his new

Daily Steel Deliveries to the Electric Utility Industry

Wherever you are, Ryerson trucks are rolling your way every day . . . speeding shipments of the finest quality steel from nearby Ryerson stocks.

Carbon, alloy and stainless analyses in thousands of shapes, sizes and finishes make up this daily stream of steel. In pounds and tons it flows to your industry from the nationwide network of thirteen big Ryerson plants.

This service cuts purchasing time because one call to Ryerson, one order and one invoice quickly covers a whole group of steel requirements. Do you want one piece or a truckload? You get prompt, personal service either way. Do you want your steel sheared, sawed or slit—burned, bent, punched or threaded? You can be sure of getting quick accurate delivery from your nearby Ryerson plant. So call us next time you need steel from stock. We'll get it to you faster because we're coming your way every day.

PRINCIPAL PRODUCTS

BARS—Carbon & alloy, hot rolled & cold finished

STAINLESS—Allegheny metal plates, sheets, bars, etc.

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Sheared & U. M., Inland 4-Way Floor Plate

TUBING—Seamless & welded mechanical & boiler tubes

SHEETS—Hot & cold rolled, many types & coatings

MACHINERY & TOOLS—For metal working

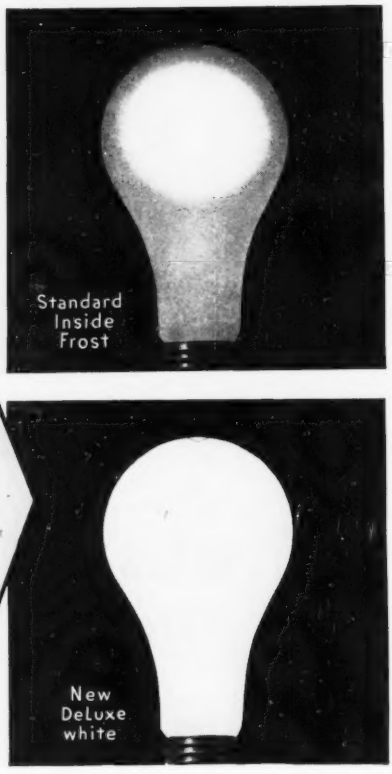
RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

BE THE FIRST

to benefit
by this
NEW AND
BETTER
BULB

the
CHAMPION
DE LUXE WHITE
LAMP!



The instant you compare this new CHAMPION Lamp with the ordinary 100 watt bulb you'll want to adopt the *De Luxe White* as your standard. It's the greatest improvement in lamp bulbs since the inside frosted bulb first came out twenty-five years ago.

The CHAMPION *De Luxe White* gives a soft, white light, highly diffused, easy on the eyes, at *no sacrifice in light output*. Reflected glare from shiny surfaces is cut way down. It's the same size, has the same electrical and illumination characteristics as the standard 100 watt inside frosted lamp. It's ideal wherever bulbs must be exposed or unshielded. It means less glare — better, pleasanter seeing.

ASK YOUR LAMP SUPPLIER TO DEMONSTRATE THE NEW CHAMPION DE LUXE WHITE LAMP

CHAMPION LAMP WORKS
Lynn, Massachusetts
A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO

position, he will be responsible for engineering activities in the entire GE turbine divisions, which include the steam turbine and generator engineering divisions, the gas turbine division (exclusive of aircraft gas turbines) in Schenectady, the steam turbine, generator, and gear engineering divisions in Lynn, Mass., and the auxiliary turbine engineering division (including diesel engine superchargers) in Fitchburg, Mass.

Mr Belanger began his career in the General Electric Co in 1917. After holding various engineering and sales positions he was made assistant manager of the federal and marine divisions in 1940 and manager of these divisions in 1943. He was appointed assistant sales manager of the apparatus department in 1945 and in 1947 was made manager of the company's turbine divisions.

Mr DuChemin entered the Lynn River Works in 1914, and by 1923 he was occupying the position of general superintendent of the West Lynn Works. He was appointed assistant works manager in 1935, acting manager in 1942, and in 1943 works manager. In 1947 he was named manager of the meter and instrument divisions, the position he held at the time of his recent appointment.

•

Martin H. McGrath, formerly assistant chief engineer, General Cable Corp, Bayonne, N. J., has been appointed chief engineer, product engineering.

W. H. Stueve, executive assistant, Oklahoma Gas & Electric Co, has been initiated into the Oklahoma University Chapter of Tau Beta Pi, national honorary engineering society, for his outstanding achievements in the engineering field.

Milton H. Prince has been appointed director of personnel of the Minnesota Power & Light Co, Minneapolis, and **T. O. Perrault** director of safety. The promotions resulted from vacancies created by the retirement of W. C. Lounsbury, who had held both positions. Mr Perrault first became associated with the company in 1941, and Mr Prince in 1936.

Charles A. Powel, assistant to the vice-president in charge of engineering, Westinghouse Electric Corp, Pittsburgh, Pa., has been appointed as lecturer in electrical engineering at the Massachusetts Institute of Technology. Mr Powel's duties at the Institute will begin in the fall of 1949. He will teach advanced courses in the use of electric power by heavy industry, a subject to which he will bring varied and unusual

personal experience. Mr Powel is widely known for his contributions to problems involving the generation and transmission of electric power and its application to industry throughout the world.

•

Danielson Elected V-P, Indiana Public Service

Announcement has been made of the election of F. D. Danielson as a vice-president of the Public Service Co of

F. D. DANIELSON

Indiana, Inc, Indianapolis. He will be associated closely with Vice-President G. J. Oglebay, handling problems of operation.

For the past ten years, Mr Danielson has been located at Dubuque, Iowa, where he was executive vice-president and director of the Interstate Power Co. A veteran operating man, he began with Utilities Power & Light Corp in 1928. His work was in connection with improved operations, sales, and the physical properties of the company's subsidiaries. In 1938 he joined Interstate Power.

Mr Danielson is a member of the power system operators committee and the industrial relations committee of the Edison Electric Institute. For two years, 1946 and 1947, he served as chairman of the industrial relations committee of the North Central Electric Association.

•

Aloysius C. Marcero, superintendent of the Conners Creek plant of the Detroit Edison Co, has retired after 35 years of service with that company. Mr Marcero has been superintendent of the plant since 1923. Also retiring is **Wesley W. Break,** plant engineer of the company's central heating plant on Beacon St. Mr Break was appointed plant engineer at Beacon St during its construction in 1926 and has been in direct operating charge of it up to the time of his re-

● The new NO-OX-ID Wrap for the protection of lead-sheathed cable against corrosion is a combination coating and wrapper in a roll, is water repellent, guards metal against penetration of calcium hydroxide resulting in manholes where cement-type fireproofing is used. Corrosion-inhibitive qualities provide a dense film, keep cables free from pitting.

Application is as easy as unwinding a roll of tape; requires no special training or skill. NO-OX-ID Wrap goes on smoothly, its paste-like consistency maintaining excellent bond. Uniform thickness (1/32") insures even coverage.

"NO-OX-ID Wrap is a happy solution to cable-corrosion problems," engineers state. "It forms a corrosion-resistant overcoat that wears well and eliminates all unprotected areas."

How to prevent corrosion of lead-sheathed cable

Positive waterproofing and corrosion resistance
●
Easy and clean to handle
●
Easily applied in narrow clearances
●
No elaborate cable cleaning necessary
●
Uniform thickness insures smooth coverage
●
Easily stocked

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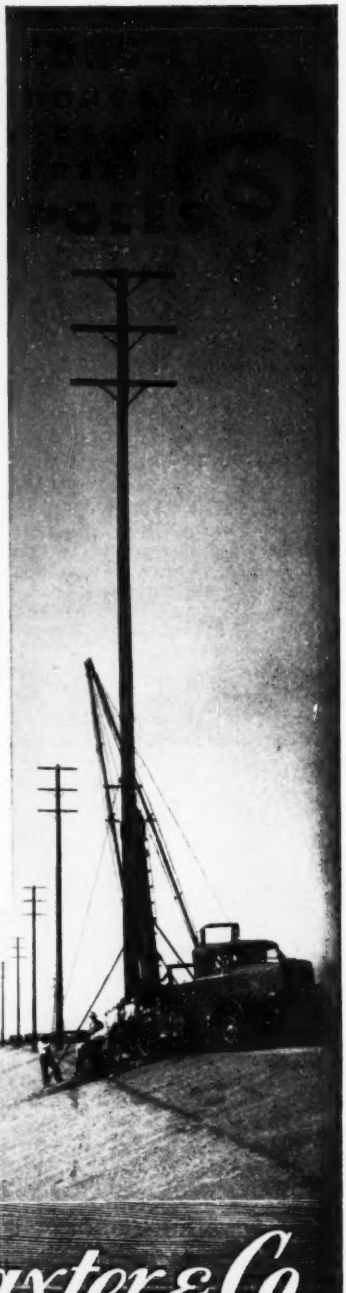
BAXCO



In transmission lines–distribution, lighting or telephone systems–wherever dependable service is of prime importance you can count on Baxco Long-Life Poles to do the job.

Baxco Long-Life Poles are strong, straight, machine shaved, Coast-type Douglas Fir pressure treated with creosote and pentachlorphenol to resist rot, termites and deterioration.

You'll be proud of these poles in your line and more than satisfied with their long maintenance-free service. Write or wire us your inquiries.

Also Produced by
J. H. Baxter & Co. of Oregon
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J. H. Baxter & Co.

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LOS ANGELES · LONG BEACH · ALAMEDA · CALIFORNIA, U. S. A.

tirement, Mr. Marcero has been closely associated with the company's pioneering work for boiler and turbine development and has had an active part in planning the two new 100,000 kw turbines which are scheduled for installation at Conners Creek in the near future. Mr Marcero's place will be taken by **Albert C. Pasini**, and Mr Beak's by **Edmund N. Brown.**

Dr. Harry L. Purdy has been appointed director of research and administrative controls for the British Columbia Electric Co at Vancouver. Dr Purdy joined the company in 1947 and since then has carried out rate structure studies, research, and preparation of statistics. His new duties will include, in addition, coordination of interdivisional aspects of operation and capital budgeting, maintenance, and organization controls, and coordination of company practices and procedures. He was assistant director of research for the Missouri Pacific Railroad for three years.

Stanley M. Hunter has been elected executive vice-president of the American Hoist & Derrick Co, St. Paul, Minn, a newly created position. Mr Hunter joined the sales department of American Hoist in 1936 and has served as vice-president of sales since 1945.

Patrick B. Smith, city engineer of Coffeyville, Kans., has been appointed city engineer and manager of utilities. Mr Smith has been engaged in engineering work for 20 years.

OBITUARY

Justin W. Lester, 83, former comptroller of the Boston Edison Co, died suddenly at Worcester, Mass., May 11. For many years he was chief accountant of the Massachusetts Department of Public Utilities. Mr Lester retired from the Boston utility in 1941. In earlier years, he was treasurer of the Worcester Consolidated Street Railway.

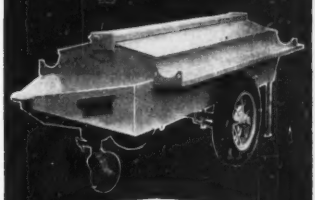
Henry H. Wotherspoon, field engineer with Mathias Klein & Sons, Chicago, since 1925, died on Apr 5 in West Palm Beach, Fla., after a brief illness. He was a member of the American Institute of Electrical Engineers.

Joseph B. Miller, 57, New England sales manager for the Electric Service Mfg. Co, New York, died recently at Belmont, Mass. He was a native of Florida, and had resided in Belmont for 25 years.

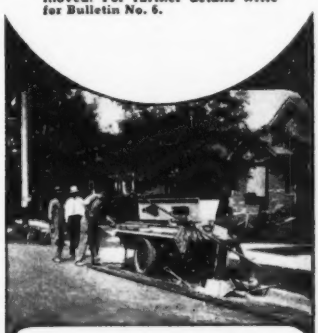
Albert A. Hall, 66, for 25 years electrical engineer with the Hood Rubber Co, Watertown, Mass., died at Natick, Mass., Apr 23. He retired in 1947.

The
NEW LITTLEFORD ALL STEEL PORTABLE "HAN DEE BOX"

The Low Cost unit for transporting valuable tools



Here's the Weatherproof, Thiefproof, Fireproof all steel HanDee-Box, the tool box constructed to trail at high speed. In addition the HanDeeBox is sturdily built, light weight and modern in appearance. The HanDeeBox too, has a patented all around locking arrangement, wide working shelves on both sides, partitions and shelves for storing tools. Gas Companies and Contractors will find this HanDee-Box the low cost method for transporting tools to the job, and leaving them overnight without fear of losing them as neither the HanDeeBox or the tools can be removed. For further details write for Bulletin No. 6.



Plenty of working area and tools are available when the Littleford HanDeeBox is on the job.

LITTLEFORD

LITTLEFORD BROS. INC.
421 E. Pearl Street, Cincinnati 2, Ohio

Case History*
of
Untreated versus Treated
Poles

1925	1946
51 Untreated Poles Placed (Northern White Cedar)	19 Poles Still Serviceable
607 Treated Poles Placed (Southern Pine)	600 Poles Still Serviceable

AND *Creosote*
MADE THE DIFFERENCE!

In 1946, after 21 years in line—600 out of 607 Pressure-Creosoted Poles were still serviceable. And of the 7 poles no longer in service, 5 had been removed because of a grade crossing clearance—2 because of an accident. *Not a single one* of the 607 poles had been removed because of deterioration due to treatment or preservative failure—a 100% record for creosote.

And when it comes to creosote, you get the best possible delivery service from Koppers. With 14 creosote-producing plants—with 4 large storage plants—Koppers can supply you with creosote *where* you need it—*when* you need it.

Koppers is the nation's largest distributor of creosote. So remember—you can always count on Koppers to help you maintain your production schedules.

KOPPERS COMPANY, INC. · Pittsburgh 19, Pa.

*Proceedings of the American Wood Preservers' Association—1947.

All Standard Specifications
For All Types of Wood Preservation

KOPPERS CREOSOTE...to be sure!

MANUFACTURERS and MARKETS

"TO SERVICE THROUGH SCIENCE" was the dedication theme of Gov Alfred E. Driscoll at the opening of the new Johns-Manville Research Center at Manville, N. J., last week. Several hundred distinguished scientists, engineers, builders, diplomats, editors and publishers took part in the dedication and tours of the research facilities, housed in four buildings located on a 93-acre tract on the Raritan River

Industrial Research Center Dedicated by J-M Corp

New Jersey added one more telling item toward establishing it as the world center of industrial research when Gov Alfred E. Driscoll on May 24 dedicated the new research center of Johns-Manville Corp at Manville. So said the governor in an address to the 500 guests and officials, as he confirmed industrial research as the mainstay of economic superiority of the American private enterprise system. He said that "government can contribute to research by carefully designed tax policies which encourage rather than discourage the investment of capital and the plowing back of earnings into the search for new and better products at a price that more people can afford." He wished he could have at his disposal a comparably endowed laboratory to study the social and economic problems confronting government.

Lewis H. Brown, chairman of the Johns-Manville board, said the comprehensive research establishment constitutes a current culmination of an intensive program of research initiated in 1928, since which time the company's business has quadrupled. He said the completion of the present stage of the research and developmental facilities parallels the completion of a $60,000,000 expansion program begun in 1945 and viewed the center as constituting an investment of between 1 and 2% of the overall plant investment 10 or 15 years hence.

Test facilities in the research laboratory now cover the range of well over half the company's products and will ultimately cover all. The pilot-plant and product development laboratory likewise will be expanded to centralize activities for all the wide scope of products devoted to control of heat, sound, and motion and protection against fire, weather and wear.

•

New Kaiser Sales Office

Permanente Products Co, sales affiliate of Permanente Metals Corp. has opened a sales office in the Boston Safe Deposit & Trust Co Building to service the New England area. Robert E. Belknap, Jr. formerly president of Griffin-Belknap Co, Inc. Duxbury, Mass., has been appointed to head the office as sales representative. The Boston office is the third sales office established by the West Coast company in the Northeast.

Wage Rise Is Asked of GE, Westinghouse

Formal requests for a contract reopening were served last week on the General Electric Co and Westinghouse Electric Corp by the United Electrical, Radio and Machine Workers, CIO.

GE suggested to UEW that the negotiations requested by the union start on June 14. The company, however, offered to start talks earlier if the union wished.

The union, which represents 125,000 General Electric and 90,000 Westinghouse workers, asked for an annual increase of $500 for each employee in wages, pension, and health programs and other economic benefits.

General Electric has already said that it does not feel a "fourth round" increase is warranted.

Contracts with the companies run until April, 1950. They provide for one reopening for wages alone, or for all economic issues, which was the basis of the most recent requests by the union.

Letters sent by the union cited unparalleled profits by both companies in 1948 and a comparable profit report for the first quarter of this year as justification for the wage demands.

GE has reported that a "substantial" decline in incoming orders in the past 60 days has resulted in "corresponding layoffs."

"We may have to make more layoffs and have some more temporary suspensions but we are doing all we can to minimize such possibility by the vigor of our advertising and selling efforts and by the attractiveness of our products," said L. R. Boulware.

Mr Boulware went on to say that GE "plans no widespread layoffs and we see no developments immediately ahead that will sharply decrease our present level of employment, which varies substantially at different locations but is on a company-wide average only about 7% below our all-time peak."

•

Form Major Appliance Unit

Formation of the Major Appliance Division of NEMA has recently been authorized. It will consist of the fol-

ANOTHER GREAT TRIUMPH FOR HOTPOINT . . . ANOTHER GREAT SELLER FOR YOU!

Hotpoint Automatic Washer

Outwashes Them All!

Everybody—Yes, EVERYBODY'S Pointing to Hotpoint...the Sensational New Automatic Washer That Has Everything!

● **Here's the automatic washer** that thousands of women have asked for—the *perfected and proved* Hotpoint with sensational Swirlaway Water Action, Fluid Drive Power, Wond-R-Dial Water Saver and Agitator Principle!

Homemakers helped plan this great Hotpoint Automatic—homemakers helped prove it *outwashes them all!* Hotpoint's exclusive Swirlaway Water Action was developed during more than a decade of tests in actual homes.

Look at the advancements this glamorous new appliance offers—Sediment Ejector, Overflow Rinse, top loading, adjustable leveling, hot and cold spray rinses, deep Thriftivator rinse plus many more! Here's *another* money-making reason why dealers call Hotpoint *The Franchise With A Future!* Hotpoint Inc. *(A General Electric Affiliate)* Chicago 44, Ill.

PERFECTED

PROVED

A SUPERIOR PRODUCT—FROM CHICAGO'S VAST INDUSTRIAL RESOURCES

Yes, Hotpoint Has All The Features Your Customers Want!

● **Fluid Drive Power** checks harmful vibration, reduces wear and tear, greatly prolongs washer life and makes bolting down unnecessary!

● **Wond-R-Dial** permits exact control of water used—both as to temperature and quantity. Saves plenty of hot water and soap.

● **Sediment Ejector** expels dirt solids from the bottom of the wash tub . . . OVERFLOW RINSE lifts soap scum and film off the top.

● **Agitator Principle** is the proved principle for best results. Exclusive SWIRLAWAY WATER ACTION is the agitator principle at its best!

Everybody's Pointing To

Hotpoint

RANGES • REFRIGERATORS • WATER HEATERS

FOOD FREEZERS • DISHWASHERS • DISPOSALS®

CLOTHES WASHERS • DRYERS • IRONERS

CABINETS & SINKS

YOU
JUST
CAN'T
BEAT
SUPERIOR
METER TESTING AND
INSTALLATION EQUIPMENT
FOR
QUALITY
AND
LONG-LASTING
ECONOMY

Test Blocks • Test Switches
• Special Switches • Test Tables •
Safety Blocks • Meter Enclosures • Meter Connection Units
• Reactiformers • Transformer
Enclosures • Accessories

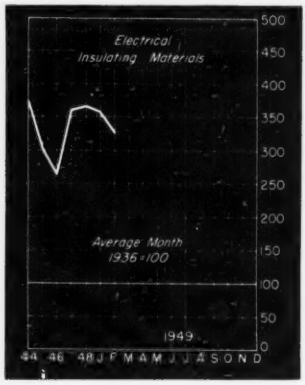
SUPERIOR
SWITCHBOARD & DEVICES CO.
CANTON, OHIO
A subsidiary of
THE UNION METAL MANUFACTURING CO.

lowing sections: household refrigeration, farm and home freezer, electric water heater, and household sink units sections.

•

Insulating Materials Sales Declined in February

Sales billed on electrical insulating materials during the month of February, 1949, dropped sharply from the



preceding month, according to the index compiled by the National Electrical Manufacturers Association. The index moved downward from 359 in January to 327 in February, a decrease of 9%.

In February, 1948, the index stood at 351, this year's figure representing a decrease of 7%.

•

Proctor Electric Co Halts Operations Temporarily

Proctor Electric Co, Philadelphia, recently announced the temporary suspension of manufacturing operations, effective May 16.

Difficulties in getting into production on a new model iron and model change-over on the toaster line were given as the reasons for the temporary shutdown. The company believes that distributor inventories will be adequate to provide retailers with merchandise during the period.

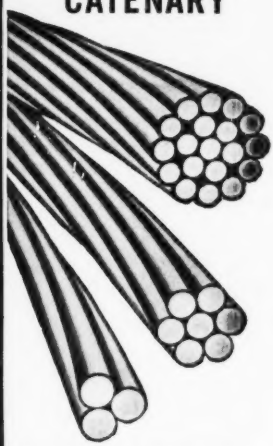
Management hopes that it will be possible to get back into full production in a short time.

•

Gives Suggestion Awards

A total of 17,629 employees of the General Electric Co received cash awards totaling $277,218 during 1948 for suggested ideas leading to improvements in plant and office operations, A. D. Marshall, assistant secretary of the company, has announced.

PAGE
Stainless Steel
STRAND
Real Economy
for GROUND
GUY
MESSENGER
CATENARY



HERE'S WHY:
HIGHER
Corrosion Resistance
Tensile Strength
Elastic Limit
Resistance to Vibration
Strength to Weight Ratio
RESULT IN
LOWER
Cost per year of Installed Life
Write us for literature or answers to specific engineering questions

ACCO
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Pittsburgh, Philadelphia, Portland, San Francisco, Bridgeport, Conn.
PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

FREE

From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

28 PAGES of helpful facts to know about COTTRELL ELECTRICAL PRECIPITATORS

IF YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this booklet on the COTTRELL Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known COTTRELL Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 42 years Western Precipitation has consistently led in developing new COTTRELL advancements and techniques for recovering suspensions from gases, both wet and dry.

This 28 page booklet summarizes many of the basic facts you should know about modern COTTRELL Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C 103.

Packed with helpful COTTRELL Information!

This Western Precipitation Cottrell booklet is designed to answer questions of design engineers, plant engineers and others interested in applying Precipitators to the recovery of industrial dusts and mists. It discusses such subjects as...

- **Basic types of Cottrell Electric Precipitators.**
- **Principal parts of a Cottrell Precipitator.**
- **Mechanical and Electronic Rectifiers.**
- **Various types of Collecting Electrodes (rod curtains, corrugated plates, dual plates, pocket electrodes, etc.).**
- **Removal of Collected Material.**
- **Factors in Shell Construction (steel, concrete, brick, etc.).**
- **Operating Efficiencies and the Effect of Various Factors on Performance.**

...and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

NOW SELLING...

COTTRELL Precipitators
MULTICLONE Collectors
TURBULAIRE Spray Dryers

...in all parts of the U. S. A. and foreign countries.

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PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

"Give us the tools..."

YOUR ONLY CHANCE of Getting Ahead

Where is the "brave new world" so glowingly promised us by the politicians during and after the war? We were told then that postwar America would live 50% better than it had before. Why has that promise faded out? Why are men today discouraged and frustrated?

We have not yet made good 1944's promises because the *American worker turns out no more in an hour now than he did in 1941.* We are getting more total production in our country – but only because we have more people working. Not because each one of us is producing more. American industry's ability to turn out more and more goods – with less of each worker's time and effort – has been stymied for eight long years.

Progress has been blocked because in some cases workers have not been willing to work as hard as they did before the war. In other cases unions restrict the use of labor-saving machines and methods. In some places obsolete building codes and ordinances prevent advances. In still other cases progress has been blocked by collusive practices between unions and manufacturers or operators.

But the biggest block to progress is the fact that our industry in the United States has been unable to provide our workers with all the new tools and equipment that they need.

Increasing productivity – that is, each one of us turning out more in each hour of work – is the key to higher living standards. Productivity depends directly upon the kind of tools workers use. His tools, more than anything else, determine how much a worker can turn out; and what his paycheck will buy depends in large part on what he turns out–not on how long or how hard he works.

Look what happened in our country in the forty years from 1900 to 1940. Productivity of the United States *more than doubled.* It doubled because:

Business investment in capital equipment gave workers new tools – tools that had three and one-half times as much power –

So – Americans' living standard rose almost 50% while the average work week was dropping from 61 to 43 hours.

Industry did continue to raise its output per man hour, even in the depressed 1930's. But it did it because, with unemployment widespread, companies used only their most efficient equipment. *Actually the great depression saw industry fall far behind in the job of providing workers with new tools.*

Then came World War II. Few new tools for peacetime industry were produced. *As a result of depression and war, the U.S. fell behind in needed investment in new industrial facilities by more than $100 billion.*

Since the war business has spent almost $60 billion for new plants and equipment –

But the greater part of that money went to *expand* production to take care of the needs of our bigger population, and to *replace* plants and equipment that were worn out and ready to be junked at the end of the war.

continued on next page

Only a small fraction of the $60 billion went to *modernize equipment* – the equipment that increases efficiency and improves productivity of the individual worker.

Right now industry is desperately trying to do the job of increasing efficiency of machines so that each worker can turn out more.

McGraw-Hill's national survey of Business' Needs for New Plants and Equipment shows that manufacturers plan right now to spend in the 5 years ahead three-quarters of their capital funds to replace and modernize facilities. The biggest part of the more than $55 billion industry plans to spend on its plants and equipment will go directly to improve efficiency of the individual.

If industry can carry through its plans – and expand them as it would like to and as it must do – the U. S. can catch up on its depression-war-time lag in progress within a few short years.

If American industry is allowed to earn the money to buy the equipment, it can raise the American standard of living 50% in our generation – in the next 25 years. No other nation can promise its people that much – and deliver on the promise.

But the promise can only be fulfilled by American industry. Wherever you turn, industry has dramatic new ways of doing things. Using oxygen by the ton, steel makers are increasing production from blast furnaces by 20%. New high-speed machine tools are doing three times the work of 1940 tools. A new coal-mining machine will multiply a miner's daily output 10 times. Diesel locomotives do the work of three steam locomotives on many jobs.

New products – and larger production of standard products – are already making their impact on American life. Two million Americans will get new television sets this year. Automatic washing machines, electric dishwashers, and home freezers are easing the daily tasks of thousands of housewives. Millions of homes that did not have them before the war now have telephones, automatic heat and refrigerators. Frozen foods, nylon clothing – these and many other things coming along now – will shape the *real* new world for Americans.

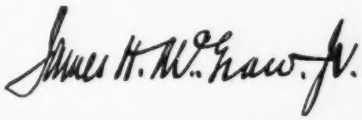
But industry can provide them only if it can keep on investing at least $15 billion a year now – and more in future years – in new plants and equipment.

Today Washington is taking a course which, if pursued, will make that investment by industry impossible. Government spending now strains our resources to the limit, and more multi-billion dollar spending proposals are being piled on. *But government spending cannot improve American living standards.* It never has, and it never will. Increasing government spending *now* will only block progress, because the government proposes to pay for its plans by taxing away the profits industry is using, and must continue to use, to improve and expand its plants and equipment – our only hope for greater worker productivity and higher living standards.

Better living can only be paid for with more production. And we can only get more production by increasing productivity – by each one of us producing more for each hour of work.

The first thing is to get the production – in peace and in war – for better living – for security. Industry is planning to provide it – and is using $13 billion of its profits this year to improve and expand its facilities.

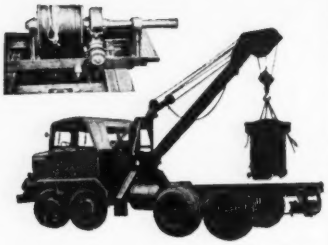
The only sensible, the only safe national policy is to make it possible for American industry to do its job – not to terrorize private industry with proposals of ruinous taxation and paralyzing controls and threats of nationalization. For American industry is not a thing apart from the American people any more than is government. American industry is the lifeblood of the American people and whatever makes industry do its work better contributes more to the common welfare than a bureaucratic government can ever hope to do.



President, McGraw-Hill Publishing Company, Inc.

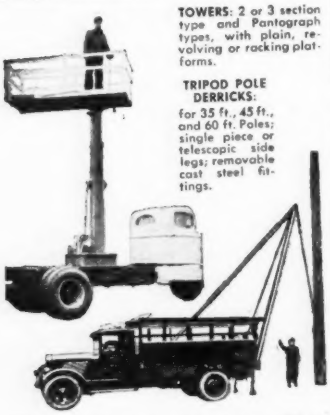
Utilities Have Specified
SILENT HOIST Equipment
• Since 1918 •

KRANE KAR Swing Boom Mobile Crane: for materials-handling . . . lifting, transporting, positioning, gasoline or Diesel, 1½, 2½, 3 and 10 ton capacities, 9 to 37 ft. booms (or telescopic booms), solid or pneumatic tires. Self-stabilizing without jacks or outriggers; unobstructed vision; fast, flexible, safe, easy to operate.



WINCHES: Capstans; Single and Double Drum, Jaw Clutch, Keyed and Friction Clutch Winches. 2,000 to 50,000 lb. Capacities.

SWING BOOM CRANES: Truck: Motor Power Operated; high capacity; takes up only a small space. For handling transformers, cable reels, lamp posts, trees, poles, manhole castings, etc. 9 to 31 ft. booms; one to 10 ton capacities.



TOWERS: 2 or 3 section type and Pantograph types, with plain, revolving or racking platforms.

TRIPOD POLE DERRICKS: for 35 ft., 45 ft., and 60 ft. Poles; single piece or telescopic side legs; removable cast steel fittings.

USERS: AT&T; N. Y. Tel. Co.; T.V.A.; Consolidated Edison Co.; W.U.; Municipalities throughout America.

WRITE FOR CATALOGS:

No. 79—KRANE KAR *No. 70—Truck Equipment*

THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

3½, 5, AND 10 TON CAPACITIES

KRANE KAR

TRADE MARK REGISTERED

SILENT HOIST & CRANE CO.

862-63rd ST., BROOKLYN 20, N. Y.

NEW ELECTRICAL CONSTRUCTION

NEW ELECTRICAL construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included

UTILITIES

Proposed Construction

Alabama — Pea River Electric Corp., Clayton, 254 mi. rural distr. lines, Barbour, Dale and Henry Counties. Plans deposit $25. Mowbray Eng. Co., P. O. Box 93, Greenville, engr.

California—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., 9 distr. boards, 1 distr. panel board, one 125 volt battery control and distr. board, two 10-kw. battery chargers, 2 fire-control cabinet assemblies, two 150 kva. and one 75 kva. transformers, 20 thermostats, 3 pressure temperature switches for Tracy Pumping Plant and Switchyard, Central Valley Proj., Spec. 2642.

Fla., Cocoa—U. S. Air Forces Defense, Wash., D. C., first unit of $200,000,000 guided missile test center at Banana River Naval Air Station, on Merrits Island, near here. **$75,000,000.**

Fla., Greenville—Seminole Electric Cooperative, Greenville, oil-fueled electric generating plant and connecting transmission lines to supply electric current to 7 regular co-operatives which make up the Super Seminole Co-operative, **$18,000,000.** C. P. McLean, Moultrie, consult. engr.

Georgia—Troup County Electric Membership Corp., La Grange, 253.9 mi. rural distr. lines, Troup Co. **$253,000.** J. B. McCrary Eng. Corp., 22 Marietta St. Bldg., Atlanta, Zone 3, engrs.

Kansas—Victory Electric Co-operative Assn., Dodge City, 358 mi. rural distr. lines, sys. imprvs., 15 mi. tie line, 2 way radio communication sys., Ford Co. **$496,000.** Frank Horton & Co., Lamar, Mo., engrs.

Minnesota—Dairyland Electric Co-operative, Grand Rapids, 109 mi. rural distr. lines, sys. imprvs., 7 mi. transmission lines, headquarters facilities, South Itasca Co. **$130,000.**

Missouri—New-Mac Electric Co-operative, Neosho, addnl. rural distr. lines, sys. imprvs., Newton, Jasper, Lawrence and MacDonald Counties, **$659,000.**

Montana—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars at Circle, two 115,000 volt, 600 ampere, 3 pole, single-throw, horizontal-upright pole-top mounting manually-gang-operated outdoor horn-gap switches with manually-gang-operated grounding blades, McCone Co. Electric Co-operative, substation (Circle substation) Fort Peck Proj., Spec. 2677, furnishing, del. f.o.b. cars shipping point or f.o.b. cars Louisville, four 77 in. regulation gates, hoist, drive units, indicators and limit switches, one set erection equip., four sets conduit sections for river outlets, Canyon Ferry Dam, Canyon Ferry Unit, Missouri River Basin Proj., Spec. 2681, L. N. McClellan, ch. engr.

North Carolina — Rutherford Electric Membership Corp., Forest City, 615 mi. rural distr. lines, sys. imprvs., 12 mi. new tie lines, Rutherford Co. **$1,108,000.**

Ohio—Guernsey-Muskingum Electric Co-operative, New Concord, 80 mi. rural distr. lines, sys. imprvs., 25 mi. new tie lines, Guernsey Co. **$285,000.**

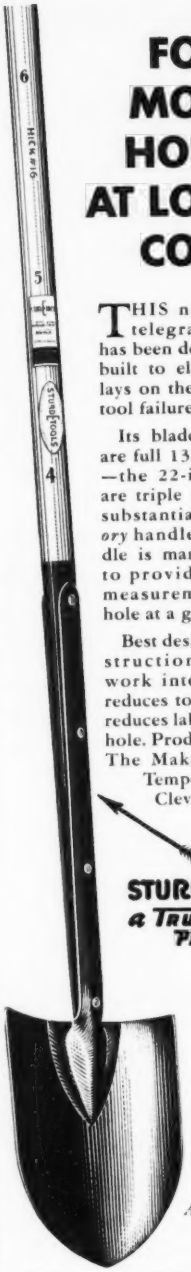
South Dakota—Ree Electric Assn., Miller, 573.3 mi. rural distr. lines, Hand Co. $575,000. Bannister Eng. Co., 1549 University Ave., St. Paul, Minn., consult. engr.

Tex., Houston — Houston Lighting & Power Co., 1016 Walker St., West Junction Station plant expan. Approx. **$1,000,000;** turbine generator unit and appurtenances. Approx. **$1,000,000.**

Tex., Jourdanton—Humble Oil & Refining Co., Humble Bldg., Houston, 3 kw. generating units, to Hudson Eng. Corp., 2711 Danville St., Houston. **$450,000.**

Washington—Bonneville Power Admin., 729 N. E. Oregon St., Portland 8, Ore., 5.4 mi. Grand Coulee-Snohomish East

FOR MORE HOLES AT LOWER COST



THIS new SturdE telegraph shovel has been designed and built to eliminate delays on the job due to tool failure.

Its blade and strap are full 13 gauge steel —the 22-inch straps are triple riveted to a substantial *solid hickory* handle. This handle is marked in feet to provide accurate measurement of the hole at a glance.

Best design and construction—reduces work interruption—reduces tool costs and reduces labor costs per hole. Produced only by The Makers of True Temper Products, Cleveland, Ohio.

STURDETOOLS
a TRUE TEMPER PRODUCT

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ArmaWind

AW

Transformer
Cooling
Fan

F.O.B. JR 55.00 INCLUDES TAX

MATERIALS: G. E. ¼ H.P., 115 V., 1 Phase, motor for outdoor service. Sealed ball bearings. Water slinger on shaft. 2 ft. Geoprene leads. 18" steel, 3 blade, Cadmium plated fan. Spot welded guard of ¼" steel rod. Baked enamel finish. Shipping wt. 60 lbs.

ACTION: A long life fan of engineered design, that delivers a high velocity volume. Air Movement 8,513 C.F.M. 6 ft. from blade, with Average Velocity of 537 ft. per minute over 4'6" Diameter Circle. Easily carried by one man. Quick adjustment of fan angle—from 30 degrees below horizontal to vertical. Can be mounted permanently on a pipe structure.

RESULTS: ArmaWind Transformer Cooling Fans have "stood up" for 15 years. One utility company has purchased over 1500. Many satisfied users. Prompt shipment—from our plant to you.

Also, Makers of Man Cooling Fans.

Armature Winding Co.

Charlotte, N. C.

Switchyard extens. 230 kv. steel tower line, Okanogan and Douglas Counties, Inv. 46040. Plans deposit $25. 26.9 mi. Fairmont-Port Angeles 115 kv. transmission line, Jefferson and Clallam Counties, Inv. 4637. Plans deposit $25. 77 mi. Columbia-Grand Coulee No. 3, 230 kv. transmission line, Douglas, Grant and Okanogan Counties, Inv. 4632. Plans deposit $25.

Washington—Bureau Reclamation, Ephrata, 13.8 kv. transmission line and taps from 115/13.8 kv. Barbank substation to Burbank Pumping Plant 1. (Region 1), Columbia Basin Proj., Spec. R1-CB-15.

Low Bidders & Contracts Awarded

Arkansas—Valley Electric Co-operative, Ozark, May 10, rural distr. lines, Crawford, Franklin, Johnson, Sebastian Logan and Pope Counties, from B. B. Winset & Co., Ozark, **$154,858.**

Idaho—Bureau Reclamation, Dpt. Interior, Idaho Falls, 48 mi. 115 kv and 3.5 mi. 44 kv transmission lines, Goshen to Palisades, Palisades Proj., Spec. R1-40 (Region 1), to Askevold Constr. Co., Inc., and Darnell Constr. Co., Missoula, Mont., **$581,516.** Bids 4/26, awarded 5/13.

Mich., Mount Clemens—General Motors Corp., General Motors Bldg., Detroit, Zone 2, 235,000 sq. ft. technical center, incl. Engineering bldgs. (administration and drafting, shop and dynamometer bldgs.) 427,000 sq. ft. research laboratories div. (metallurgical, laboratory, mechanical and processing bldgs.) power plant, sewage disposal plant, pump house, and reservoir, water tank, central kitchen, etc. Macomb Co., near here to Bryant & Detwiler Co., 2304 Penobscot Bldg., Detroit, Zone 26. Saarinen, Saarinen & Assoc., Bloomfield Hills, archts. Smith, Hinchman & Grylls, Inc., 800 Marquette B'dg., Detroit, Zone 26, archt. and engr.

Nebraska—Cornhusker Rural Public Power Dist., Columbus, 193.5 mi. rural distr. lines, Madison and Boone Counties, to Jacobs & Doyle, Edgewood, Ia., **$208,928.** Bids 5/9.

Okla., Woodward—Western Electric Co-operative, Woodward, diesel electric generating plant, to Tankersley Constr. Co., 1st Natl. Bldg., Oklahoma City, Zone 2, **$98,059.** Bids 1/15, awarded 5/16.

Tex., Houston—Houston Lighting & Power Co., 1016 Walker St., sub-station off Walker St., **$275,000;** electric shop, storage and display bldg., Washington Ave., **$300,000,** own forces. Carl G. Elliott, Jr., 4511 Kayle St., archt. on latter project.

Tex., El Paso—El Paso Electric Co., Martin Bldg., power plant unit, own forces. Approx. **$250,000.**

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Md., Chevy Chase and Bethesda—Woodward & Lothrop, 10 and 8 Sts. N.W., Wash., D. C., plans by Starrett & Van Vleck, 267 5 Ave., New York, Zone 16, N. Y., department store, Wisconsin and Western Aves. **$3,000,000.**

New York—Bureau Pub. Wks., Municipal Bldg., New York, Zone 17, plans by York & Sawyer, 101 Park Ave., Zone 17, general hospital for Dpt. of Hospitals, **$17,200,000.** Fellheimer & Wagner, 155 E. 42 St., Zone 17, consult engrs. To go ahead in 1951.

N. Y., Flushing—Local 3, International Brotherhood of Electric Workers, 130 E. 25 St., New York, Zone 10, 2,000 apartment housing development on 103 acre site, Kissena Blvd., 71 Ave., 164 St. and 65 Ave. **$20,000,000.**

Tex., Houston—Katy Park Industrial Development Corp., c/o Tom C. Mabry, vice pres., M-K-T. Ry. Co., 1811 Ruiz St., 20 story masonry, steel, concrete office and terminal, N. Main St. opposite M. & M. Bldg. $15,000,000. Wyatt C. Hedrick, 15201 Fannin St., engr. and archt.

Low Bidders & Contracts Awarded

Conn., Greenwich—Greenwich Hospital, 18 W. Putnam Ave., general contract hospital addn., to George A. Fuller Co., 57 St. and Madison Ave., New York 22, N. Y., Approx. **$4,760,000.** Bids 5/5.

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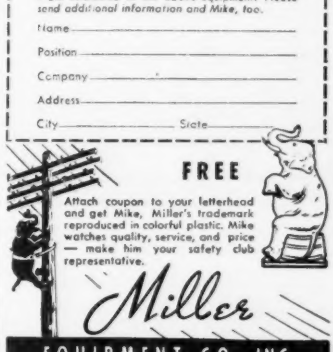

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RECENT RATE CHANGES

Pennsylvania Power & Light Co has put into effect rate increases for 1,973 large industrial and commercial customers, which will yield an additional $514,864 annually. The new rate is a separate increase from that effective on June 22 for the average household light bill. (EW, May 7, p 129). This new industrial and commercial rate increase has been sought "to partially offset the company's greatly increased costs." PP&L had filed a fuel adjustment clause early last year on service to customers using more than 15,000 kwhr a month and supplied under electric rates not already subject to a fuel clause. The new rates expanded last year's application to include the first 15,000 kwhr under the 12 rates schedules affected, generally described as large commercial, industrial, and resale applications. The company has asked the Public Utilities Commission's approval to raise Harrisburg's light bill $12,041 a year to cover the cost of new lighting facilities in the capital's business section.

New Jersey Power & Light Co has filed with the Board of Public Utility Commissioners of New Jersey an application to permit it to increase the level of charges to its customers in the total amount of $1,015,000. In announcing this action, H. C. Thuerk, president, said, "This is the first time in the history of the company that an increase in rates has been requested. . . . Coal prices have risen 60%; copper wire has more than doubled in price; transformers, poles, crossarms, and all the other equipment the company uses have shown substantial price increases. Average hourly wage rates have been almost doubled in the same period." The proposed new rate schedules will add less than 2¢ a day to the average bill of residential customers. Revisions proposed in the net electric rates for commercial and industrial users will result in an average increase of approximately 14%. Modest increases have also been proposed in the charges for street lighting and miscellaneous services.

Portland General Electric Co and **Pacific Power & Light Co** have been granted electric rate increases by Oregon Public Utilities Commissioner George H. Flagg. Portland General Electric has been granted additional annual revenue of $1,470,000 and Pacific Power additional revenue of $320,000 a year from its customers in the Portland and Rainier, Ore., areas. The increases will go into effect at the next billing. The new schedule boosts the all-purpose rate about 11% and residential rates about 6.5%.

Cleveland Electric Illuminating Co's application for an increase in rates to large industrial and commercial users has been approved by the Ohio Public Utilities Commission. The new rates, to become effective as soon as new rate schedules are filed with the Commission, will apply to about 2,500 customers in the Cleveland area and will mean an additional net revenue of between $2,100,000 and $2,800,000 annually.

San Diego Gas & Electric Co has filed an application with the California Public Utilities Commission for an increase in rates for electric energy, gas, and steam distributed in the San Diego area. The increase in rates would amount to $1,139,900 a year. Present rates do not yield a fair return on the investment, it was claimed.

BOOK REVIEWS

Handbook of Chemistry and Physics. By C. D. Hodgman. Published by Chemical Rubber Publishing Co., Cleveland 14, Ohio. 2737 pages. Price. $6.

This is the 31st edition since 1914 with almost annual additions and corrections. The latest volume has about 300 pages of mathematical tables, 1,000 of essentially chemical data, 400 on such characteristics as solubilities, pH values, etc.; 600 on such physical properties as thermal expansion and conductivity, cell emfs and electrochemical equivalents and 300 on conversion factors, electronics, photographic chemistry, etc. Freshly added material embraces extensive data on some 900 radioactive and natural isotopes, a table of squared sines and cosines for curve analysis and a comprehensive compilation of wave lengths of emission spectra of the elements. Briefly the prime usefulness of this voluminous reference book for the electrical laboratorian concerned with ASTM tests or any similar reasonability is in the means it provides for identifying any chemical, answering its properties, use and reactions whether organic or inorganic. A retained feature of unusual merit is the converse listing of chemicals which can be employed to meet certain criteria of melting point or evaporation temperature.

Handbook of Patents. By H. A. Toulmin, Jr. Published by D. Van Nostrand Co, Inc, N. Y. 800 pages, illustrated. Price. $9.

A patent attorney wrote this with the lay inventor in view all the way. The language is as simple as the special terminology of the patent laws and procedures permit. Like all law books there is citation for every point mentioned but the lay individual can leave those to his attorney. Probably the most pertinent sections for the engineer bent on invention are those which tell him how to protect his discovery until he can prosecute his application, how he can retain certain rights and returns even though a corporation employee, how he can be most helpful to his attorney in preparing the application and the defense if it is granted and subsequently infringed. The later sections and appendices give sample forms, rules for drawings, standard symbols, and instructions for appeal from patent office decisions.

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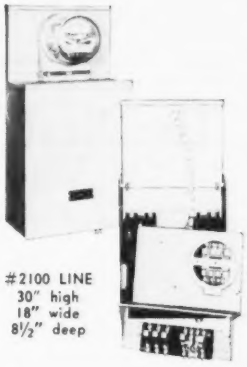

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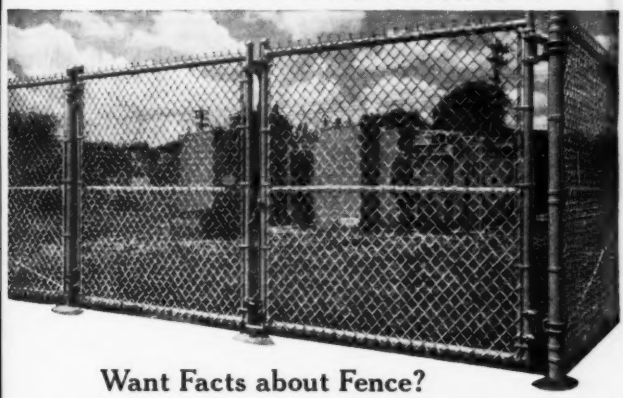

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LETTERS TO THE EDITOR

Wisconsin River vs. TVA

To the Editor of ELECTRICAL WORLD:

I have only recently found time to read the reprint entitled "One Less River to Boss" from the ELECTRICAL WORLD of August 14, 1948. Even at this late date, however, I feel called upon to comment on this article in an effort to set the record straight.

I don't believe that one can compare the development you describe in the Wisconsin River with the program of the Tennessee Valley Authority. In the first place, public attitude and the national concept with regard to the handling of our natural resources have changed considerably since about 1907 when the charter was granted to the Wisconsin Valley Improvement Company. It is now public policy that our resources be developed for the greatest good of the greatest number rather than that they be exploited for private gain. The TVA was conceived and has been operating in terms of this new concept, whereas the Wisconsin River development has been primarily in the interest of financial benefit to the nine electrical, utility and paper companies.

It is only natural that in an undertaking such as the Wisconsin River Improvement Company, human nature being what it is, primary consideration will always be given to the financial welfare of the stockholders and secondary consideration, if any, to the public interest. As the article states, the WVIC "isn't even trying to save the Wisconsin River Valley—except from floods, low stream flow, and improper management of the stream's water resources . . ." WVIC is primarily interested in the development of power for its utility and paper company stockholders who have a monopoly of the benefits which are to be derived from the river. Only owners of a "water power benefited or capable of being benefited by the reservoirs" can be cut in on the deal.

With but minor restrictions the State Legislature turned over to WVIC the complete use of the entire river, in return for which it required only incidental flood control and the right to tax such facilities as WVIC should decide to build. Thus the benefit to the public generally is very small. On the other hand, the private utility and paper companies who control the development are receiving water for the amazingly low cost of $2 a kw-year.

Even though the article states that it is difficult to make an accurate comparison with TVA, it makes the attempt—and in so doing falls into the error of trying to compare the cost of gasoline which runs the car to the cost of the car itself. For instance, on page 11 it is noted that "TVA costs $13,099 per cfs . . . WVIC costs $175 per cfs." It isn't pointed out, however, that TVA's investment, in addition to that portion of the dams properly allocated to power, plus the power facilities and transmission lines, includes vast expenditures for flood control, navigation, and other beneficial uses, whereas WVIC includes only facilities to store and release water. To make the comparison in any way real, the figure for WVIC should have included at least the investment of the nine companies in generating and transmission facilities and other costs having to do with the actual production of power.

It would seem to me that the writer of this article is depending upon the public's lack of information, which allows him to camouflage this beautiful illustration of the few benefiting at the expense of the many.

C. Girard Davidson
Assistant Secretary
U. S. Department of the Interior
Washington, D. C.

Pole Top Reactors

To the Editor of ELECTRICAL WORLD:

We have read with considerable interest the item on pole top reactors under "Technical Notes" in the March 19th edition of ELECTRICAL WORLD NEWS ISSUE. These outdoor, high impedance, low current capacity reactors have been built by us for the past three years. The fact that we have had repeat orders indicates the reliability and fair price of the design.

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Snake River

To the Editor of ELECTRICAL WORLD:

I have read with great interest your story on the Snake River—and, if possible, with greater interest, the editorial on this story and the Wisconsin River one.

You are doing the utility industry a tremendous service in this matter, and, in my opinion, the nation as well.

C. E. Kohlhepp, President
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(Continued on following page)

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MICHAEL W. STRAUS, Commissioner.
(100)

ADMINISTRATIVE ENGINEER

37, EE and law degree, 15 yrs experience legal, administrative, elec engineering (utility, construction); languages; veteran.

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3—G.E. 1 PHASE SELF COOLED

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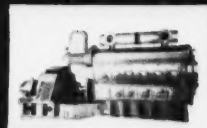

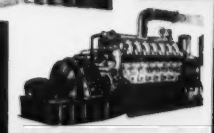

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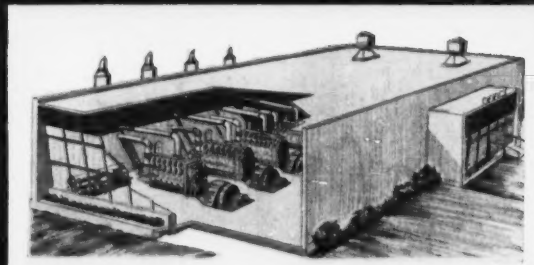

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1—100 HP. Whse, 1800 rpm 440v.
1—100 HP. Whse, 1200 rpm 2200-440v.
1— 75 HP. Whse, CS, 1200 rpm, 2200 volts, 3 phase, 60 cycle.
1— 75 HP. 1800 rpm Westinghouse, 440 volt.
1—75 HP. General Electric Type KT 900 RPM 440 volt.
2—40 HP. G.E., 900 rpm 220v.
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1—2500 HP G.E. MT 257 RPM 6600 volt
2— 150 HP G.E. Type 1M 450 RPM 440 volt.
1— 100 HP G.E. Type 1M 400 RPM 440 volt.
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75 HP. G.E. 1200 rpm 220v, 60 cy. Vert.
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1—125 HP. G.E. 1800 rpm R.C.
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VARIABLE SPEED—220 VOLTS

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1—30 HP. 440/1200 rpm General Electric.
2—25 HP. 650/2300 rpm Westinghouse.
2—25 HP. 300/900 rpm Electric Dynamic.
1—55 HP. 500/1500 rpm General Electric.

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1—100 KW. Elect. Mach. 1200 rpm 125v Generator 4150 Syn. Motor.

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1—12 KW. Hansen Van Winkle 24v 1200 rpm. 20 HP. General Electric KF Motor.
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1—1000 KVA G.E. 3 ph, 4150 volt to 2400 volt
3—400 KVA. G. E. 6900 V. Pri.—2300 V. Sec.
3—300 KVA Pitts. 2300v pri. 115/230v sec.
3—300 KVA G.E. type H 2300v pri. 115/230v sec.
3—150 KVA West. 2300 volt Pri. 240/480 sec.
1—150 KVA G.E. 2300v 110-220v.
3—100 KVA GE 4150v. 240/480v. Tyranol.
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60 CYCLE — 1 PHASE

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3—37½ KVA Niagara O.I.S.C. 2400/4160Y-240/480.
3—50 KVA Niagara O.I.S.C. 2400/4160Y-120/240.
3—50 KVA Niagara O.I.S.C. 2400/4160Y-240/480.
3—75 KVA Niagara O.I.S.C. 2400/4160Y-120/240.
3—75 KVA Niagara O.I.S.C. 2400/4160Y-240/480.
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3—200 KVA Niagara O.I.S.C. 2400/4160Y-240/480.
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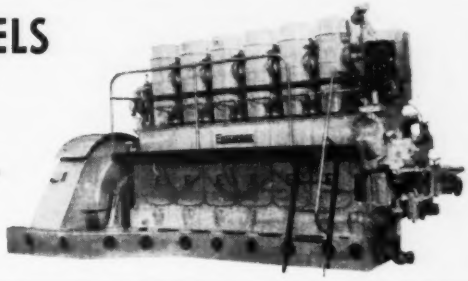

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KVA	Make	Model	HP	RPM	KVA	Make	Model	HP	RPM
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1250	General Motors	16-278A	1600	720	300	Fairbanks Morse	YVA	360	257
900	General Motors	12-567	1080	720	200	Buckeye	80	240	600
625	Superior	OS	750	327	125	General Motors	3-268A	150	1200
425	Baldwin	VO-6	510	450	75	General Motors	6016-E	90	1200
375	Enterprise	DSG-6	450	450	62	Int'l Harvester	UD-18	76	1200

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K.W	Make	R.P.M.	D.C. Volts	A.C. Volts
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1—1500	G.E.	600	600	2300/4150
1—1500	G.E.	360	275	2300/4600
1—1250	G.E.	600	275	4150
1—1000	Whse.	514	250	4000
1—1000	Cr. Wh.	720	250	2300/4150
1—800(3ø)	G.E.	1200	120/240	2300
1—500	G.E.	720	600	2300/4150
1—500	G.E.	720	125	220/440
1—400	G.E.	720	250	2300
1—400	G.E.	1200	120/240	440
1—350	G.E.	900	125	415o
1—250	Whse.	1200	250	440
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25 KW	100 KW
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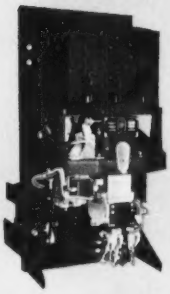

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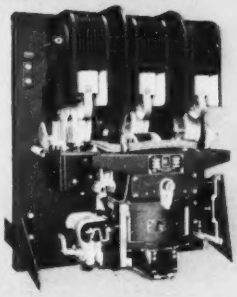

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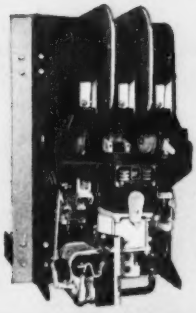

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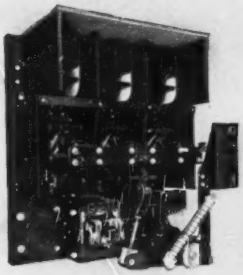

TYPE LC

100,000 RMS Amp. Interrupting Rating. 6000 Amp. Continuous Rating. 2, 3, and 4 Poles. Electrically operated.

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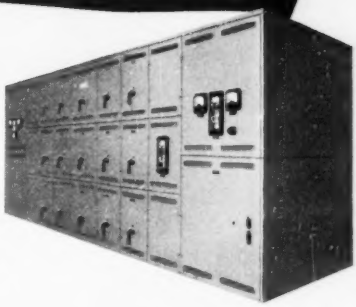

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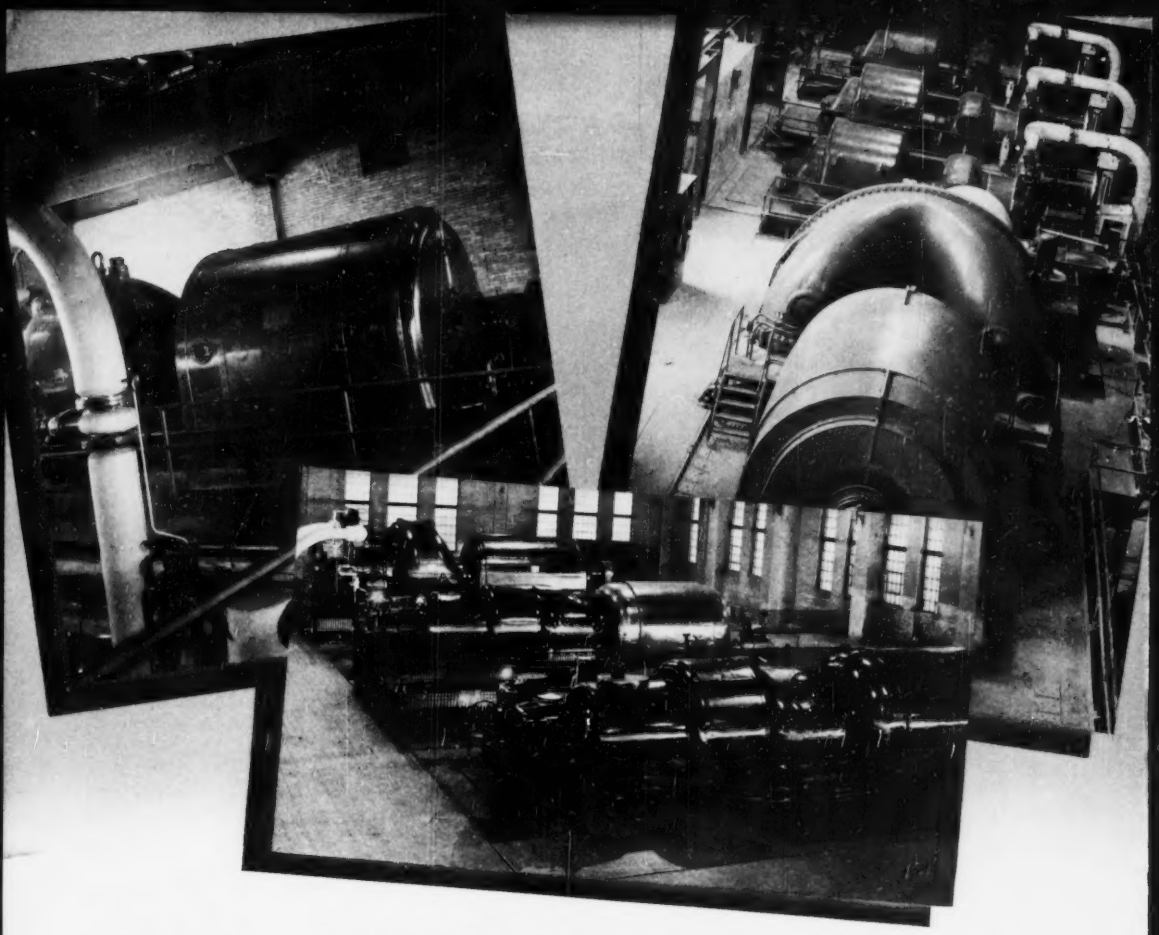

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In 1927, the Carnegie-Illinois Steel Corporation put Nonpareil Turbine Oil into a 30,000 KW General Electric turbine. Today, this company lubricates sixteen turbines, having a total capacity of nearly 200,000 KW, with Nonpareil. What's back of the impressive acceptance of this turbine oil?

Here's the 21-year record for the company's first Nonpareil-lubricated turbine: *No oil replaced, no oil removed for treating, no need to clean the oil system.*

Such economical and reliable turbine lubrication has kept Carnegie-Illinois Steel officials completely sold on Nonpareil. Why not make their experience your basis for investigating Nonpareil's advantages? A Standard Oil Lubrication Engineer will supply you with information about utility operations on which Nonpareil has reduced lubrication costs as much as 68%.

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